How One Plant Safety Committee Goes Into Action 62A
By Fred G. Hess
Who's Kidding Who About Costs? 63
Estimating Small Project Costs *By Harold E. B. Anderson* 64
Lockheed Zones Its Plants for Security 66
Scheduling and Performing Electric Control Maintenance 71
By John Foster
Free: $15,000 per Year from One Boiler *By John James Clifford*. 74
Lyon Metal's Scrap Drive Is Successful 77
How a Blueprint for the Future Helps a Plant to Grow 78
By Fred E. Vann
Analyze Your Piping System *By William W. Gaylord* 81
Additive Plant Lubricants—How They Help with Lube Problems ... 82
By T. Richard Young
A Little Jack Has a Lot of Pull . . . and Push 84
News from the Plants 86
PLANgineering 94B

'Round About with the Editors 4

Plant Engineers' Digest 28

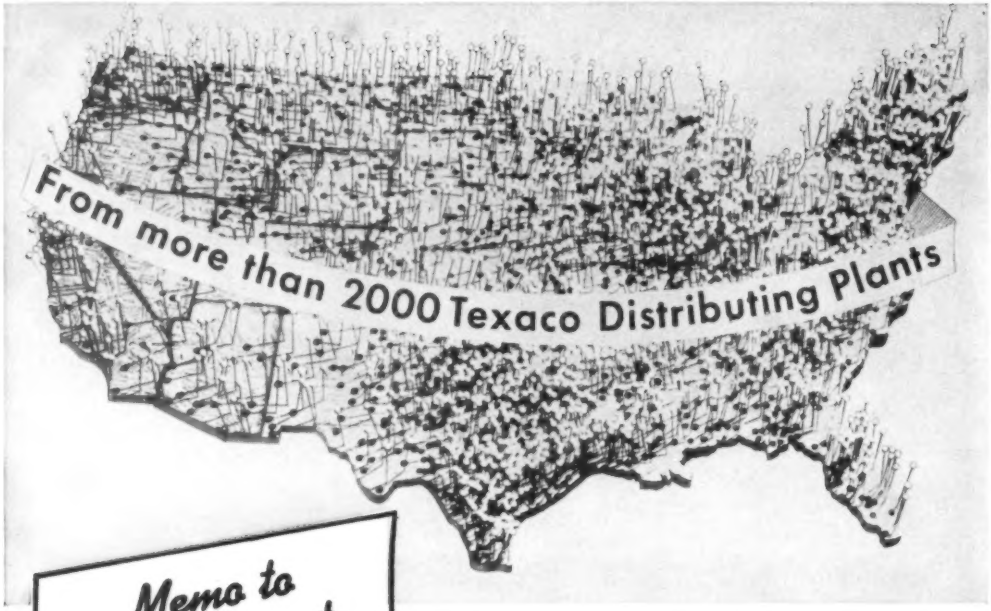
Bridge-Cranes Help Move Carpets . . . Two-Way Radio Speeds Materials Handling . . . Crating Department Cuts Costs and Does More Work . . . Improved Coupler-Handling . . . Compressed Air Leaks Do Count . . . Curtain Rod Salves Pesty Problem . . . No Smoke Here! . . . Water Impact Damages Aircraft Surfaces . . . Glass Tube Passageway . . . Make Safety a Game . . . When Floor Space Is Scarce . . . Sound Engineering Prevents Frost Heavage . . . Lard Gets a Belt Ride . . . Job of Cutting Blind Rivet Shanks Made Easy . . . Higher Performance with Lower Viscosity . . . Warning—Gremlin at Work

Maintenance and Operation 50

Bolt Size Gauge . . . Roller Tracks in Elevator Speed Freight Handling . . . Special Truck Attachment Reduces Handling Time . . . Check Outdoor Insulation . . . Simple Pipe Bender . . . Heating Cable Keeps Runways Free of Ice and Snow . . . Secure Lamp Bulb . . . Electronic Crane . . . Special Brush Lubricator . . . Towing Apparatus Simplifies Freight Handling . . . Magnetic Memos . . . Identifying Lubricants . . . Swivel Wheel Dolly Expedites Pipe Handling . . . Grind Set Screw for Secure Hold on Shaft

Bulletins and Catalogs .....45 — New Books 106
New Products .....116 — Data File of Commercial Literature 130
Advertisers' Index 150

Volume 5, No. 11 Circulation of this issue 32,453



Memo to Management

concerned with INCREASING PRODUCTION . . . REDUCING UNIT COSTS

Whatever you make . . . wherever your plant is located . . . Texaco Lubricants and Lubrication Engineering Service can help you make it better, faster, and at lower cost.

That Texaco combination has been delivering those benefits to industry for close to half a century.

The evidence of Texaco leadership is plentiful and convincing. A few examples, drawn from just one field, are given below.

Let Texaco help *you* establish a lubrication system designed to increase your production and reduce your unit costs. Texaco Lubricants and Lubrication Engineering Service are available in all 48 States.

Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

INDUSTRY PREFERS TEXACO
For example, just in the field of transportation —

MORE revenue airline miles in the U. S. are flown with Texaco Aircraft Engine Oil than with any other brand.

MORE stationary Diesels and railroad locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

MORE buses in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

TEXACO

LUBRICANTS, FUELS AND LUBRICATION ENGINEERING SERVICE

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

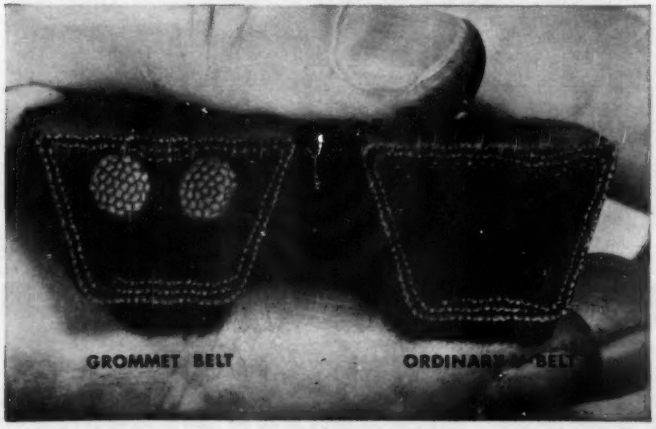
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. PE-11
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

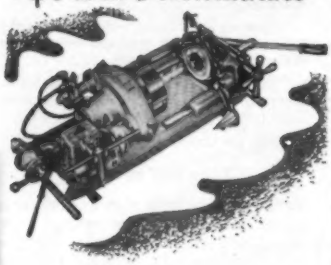
Street Address_____

City_____

State_____

• LIGHTWEIGHT
• LOW-PRICED
• EASY-TO-MOVE

the New Beaver Model-E Pipe and Bolt Machine



The new low-priced, lightweight Beaver Model "E" is a "junior edition" of the heavy-duty Beaver Model A—which has, for the past 20 years, been the recognized leader in the field of portable pipe and bolt machines.

The Model "E" uses the same dieheads—the same dies—the same patented interchangeable wheel-and-roller or knife cutoff devices—the same reamer arm and cone—as the Models A and B. This will be a great advantage to thousands of shops now equipped with the Beaver Model A or B because it eliminates the necessity of carrying in stock duplicate dies and parts—thereby preventing endless confusion and needless expense. And remember, there are 195 different kinds and sizes of dies instantly available for Models A, B or E.

Although designed primarily for hardware stores and small piping contractors, BIG contractors will find the new Model "E" useful on jobs requiring extreme portability.

A pipe machine is no better than the service back of it and our 50 years of experience in this field, and our reputation for high quality and friendly service, is your best guarantee of complete satisfaction.

Price $383.00 with quick-opening die head and ½ to 2" dies. Stand (with 14" wheels) $20.00. *Write for new bulletin—14 Outstanding Advantages*

BEAVER PIPE TOOLS

210-300 DANA AVENUE, WARREN, OHIO, U.S.A.

'ROUND ABOUT with the editors in field and office

Military Packaging Course

A JOINT MILITARY Packaging Course has been established by the Army at Rossford Ordnance Depot. The course is continuous with classes of two weeks duration, starting each week. The course will train service personnel and some civilian personnel from industry at the foreman or supervisory level. Space has been reserved in each class for firms holding military contracts with first priority given to prime or subcontractors supplying equipment packed for overseas shipment.

Applications from interested firms should be directed to Officer-in-Charge, Joint Military Packaging Course, Rossford Ordnance Depot, Toledo, Ohio. Civilian firms should furnish at least one current military contract number and a brief description of the material or equipment supplied under the contract.

Correction in Prescription For Bathing a Boiler

IN THE ARTICLE, "Prescription for Bathing a Boiler," which appeared on page 90 of the October issue of PLANT ENGINEERING, there should be a correction in the first prescription in the second column. The figure for caustic soda should read 0.60 lb instead of 0.25 lb.

Comments on Gray's Article

WE HAVE RECEIVED several comments on Albert Woodruff Gray's article, "Occupational Hazards and Employer-Employee Responsibility," which appeared on page 91 of the August 1951 issue of PLANT ENGINEERING. The readers sending in these comments wish to remain anonymous. The first reader said:

"It was our personal opinion, and this opinion has been confirmed by our company's medical department, that the court decisions referred to in this article are not the same as they would have been had the cases been tried in New York State. We are wondering if it might not be advisable for you to call the attention of other readers to the fact that the liability of an employer varies from state to state."

The second comment reads: "The opinions expressed by the Federal Courts seem too contradictory. To hold an employer liable for the furnishing of safety devices, and then hold the employee responsible for working under the hazardous conditions if the device is not installed, is contradictory. Besides, the employee cannot walk off the job so easily.

"In Mr. Gray's article, the statement is made (paragraph 6) that the employer is relieved of responsibility if "employee, knowing the injurious affect of the conditions under which he is working, continues in that work." That quote is taken out of context, and of course is subject to different interpretations. In line with this idea, then, we have now to consider the following case, by no means hypothetical, that came to this writer's attention.

"Two electric generating sets were in such bad operating condition that they would continually overspeed. The overspeed devices were inoperative due to neglect. On an occasion of overspeed, the engineer on duty would actually shut down the units by throttle instead of getting out of the room! The condition of the units was reported to the authorities but it was ignored. After several months of such nervous attrition, the units were finally repaired.

"Now, who will come up with the answers to these questions? What was the engineer to do? Walk off the job and lose tenure of several decades? Report the matter to the higher echelons, and take the rap as an informer? Leave the units to their own destruction? Stick by the job and risk an explosion? And, in event of such disaster, would the compensation board pay the widow or would the engineer be held responsible for the wreck? Let our legal sharks speak up!"

EDITOR'S NOTE: Are there any legal sharks in the audience? If anyone wishes to answer these questions, address your remarks to the Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Illinois.

Machine Tool Conference

THE FOURTH annual A.I.E.E. Machine Tool Industry Conference will be held in Rockford, Illinois, November 14th through 16th. Tentative program for the three-day conference includes three technical sessions and one complete day devoted to plant visitation in Rockford and the surrounding industrial area.

Any readers wishing additional information should contact B. T. Anderson, Chairman, A.I.E.E. Conference on Machine Tools, c/o Sunstrand Machine Tool Co., Rockford, Illinois.

(Continued on page 152)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

● **LOAD ON BOILER CUT BY 75 HP** by trapping with Armstrongs, says Chief Engineer of large midwestern hospital.

● **30°-40° TEMPERATURE INCREASE** on 8-roll ironer after unit trapping with Armstrongs, reports large eastern laundry.

● **STARCH DRYER HEAT-UP TIME CUT 2-3 HOURS** after retrapping with Armstrongs, says Canadian plant engineer.

● **125 HP BOILER NOT NEEDED** — 80 HP boiler does the job since Armstrong traps were installed in a chemical plant in Iowa.

● **50% SAVINGS IN TRAP MAINTENANCE LABOR COSTS** since installing Armstrongs at midwest agriculture machinery plant.

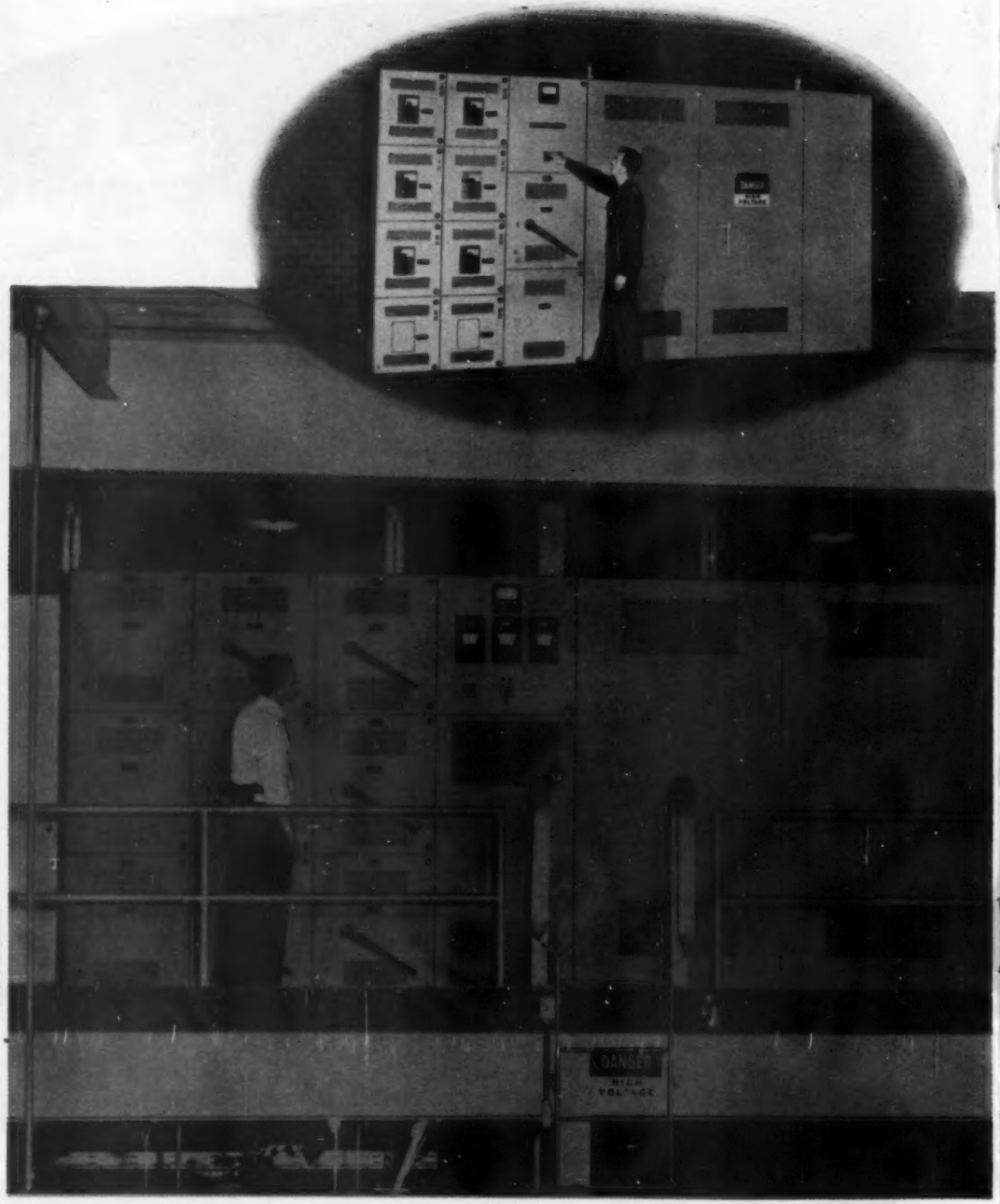
● **COOKING KETTLE OUTPUT SPEEDED UP 30%** by Armstrong unit trapping at large canning plant.

. . . BIG EFFECTS from little traps! The "shadow" cast by a steam trap is multiplied in size by the number of traps in your plant until it grows to be a giant that you can't shrug off. Let your nearby Armstrong Representative show you how Armstrong Trapping can cut *your* fuel, production and maintenance costs. Call him today.

Write for STEAM TRAP BOOK — 36 pages of useful, how-to-do-it data. Free on request.

ARMSTRONG MACHINE WORKS 912 Maple Street, Three Rivers, Michigan

ARMSTRONG STEAM TRAPS


DANGER
HIGH
VOLTAGE

Westinghouse Power Centers

Trim Power Control Costs

for Chicago Pneumatic Tool Company

Six Westinghouse Power Centers, consisting of dry-type transformers and switchgear, are serving operations in Chicago Pneumatic Tool Company's new plant at Utica, N. Y. And their favorable effect on power control costs—summed up in the following statement—suggests a savings opportunity for you.

"By bringing high voltage to the power centers, heavy copper from the main substation was avoided . . . voltage regulation and voltage drops were well within acceptable limits. Compact design enabled us to place some of the units on a small mezzanine to provide more space for production on the main floor.

"Since all units are duplicates, we enjoy maximum interchangeability and a resultant savings in spare parts. For future convenience and economy, spare feeder compartments are equipped to take additional breakers as the load increases."

Dry-type power centers will enable this user to realize even further savings. The elimination of vaults, oil conditioning and testing, promises a saving in routine maintenance. Freedom from fire hazard warrants lower insurance rates. Maintenance of a good voltage condition assures more efficient performance of manufacturing equipment.

GET THE COMPLETE STORY

Westinghouse Power Centers are the key to efficient power distribution. They offer better service continuity, greater flexibility, better regulation . . . all the things that contribute to power control economy. Most important, they provide the simplest, lowest-cost means of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein power centers offer maximum advantage. For your copies, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60763

POWER CENTERS

American Blower . . . a time-honored name in air handling

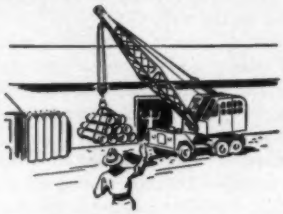
Buffalo, too, has a conveniently located American Blower Branch Office to provide you with data and equipment for air handling. You can reach American Blower in Buffalo by calling Washington 2668. In other cities, consult your phone book.

BETTER FABRICS . . .

Fine yarn filaments, strong plump fibers —these are the marks of a good textile mill. And, in many top mills, you'll find American Blower equipment helping in the control of inside temperature and humidity. For example, several of our large AHS Fans were ordered recently by an important Southern mill. The thing operators like about these fans is their non-overloading power characteristics and their remarkable efficiency over a wide range (which saves them money). May we help you with a similar problem?

HOSPITAL COMFORT . . .

A new Veterans' Hospital is going to be mighty comfortable—at least when it comes to ventilation. Reason—34 American Blower Sirocco Fans which were recently installed. These fans deliver more air per revolution than any other type of fan, operate at lower tip speeds, are unusually quiet, save power and require only a minimum of space for installation. For the best in air handling equipment, call American Blower.



POWER SAVER . . .

If you're concerned with power transmission, you'll want to know about our Gyrol Fluid Drives. Developed originally for use with mechanical draft fans, Gyrol Fluid Drives are today widely used in industry. They offer three important advantages—smoother acceleration, overload protection and substantial power savings. One company uses Fluid Drives on a crane that picks up acetylene tanks. Before they were installed, the tanks got such a violent swing from the quick start they would often damage building walls. Since using the Fluid Drives, they've had no trouble.

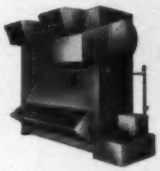
MAY WE SERVE YOU?

American Blower heating, cooling, drying, air conditioning and air handling equipment can do much toward improving comfort and efficiency in business. For data, phone or write our nearest branch office.

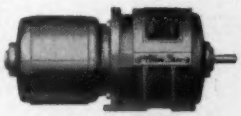
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Unit Heaters

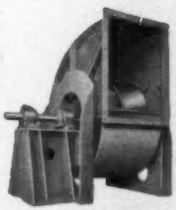
Ventura Fans



Air Conditioning Equipment



Gyrol Fluid Drives



Industrial Fans

YOUR BEST BUY AMERICAN BLOWER AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Longer bearing life on the "milk run"

Here's evidence of the superior lubrication that a midwest milk processing plant is getting through the use of STANOLITH Grease No. 42. This pump arbor and its anti-friction bearings have been run for a year under conditions of extreme dampness . . . yet there is no appreciable wear, no corrosion.

High maintenance costs and frequent replacement of bearings in both electric motors and pumps had been a direct result of excers humidity in the plant, until a Standard Oil lubrication specialist recommended the use of STANOLITH. After a test run, it was adopted throughout the plant. Now, after a full year of operation, STANOLITH Grease No. 42 has meant a 50 percent reduction in bearing replacements. Corrosion troubles have been eliminated.

STANOLITH's extreme resistance to water has payed off for this user. For your own application, STANOLITH's heat-resistant properties may be most important. Why not discuss the problem with your own Standard Oil lubrication specialist? Just call your local Standard Oil office for his service. Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

STANOLITH
TRADE MARK
Greases

What's your problem?

R. L. Hansen, of Standard's Green Bay office, is the lubrication specialist who recommended STANOLITH Grease No. 42 and helped this processor make important savings.

He and other lubrication specialists are located throughout the Midwest. They are ready to give you prompt and expert attention. If you have a lubrication problem, the lubrication specialist nearest you is the man to see.

He has been specially trained for his job in Standard Oil schools, and in addition, he has plenty of practical experience which qualifies him to give you thorough and reliable service. A phone call to the nearest Standard Oil office is all that's necessary to place him at your service. When he calls, ask him to discuss with you the performance records of the following fine products:

STANOIL Industrial Oils—This general-purpose line of oils provides cleaner operation of hydraulic units and supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire ropes, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears, better internal lubrication of wire rope.

STANDARD OIL COMPANY STANDARD (*Indiana*)

Take a whale of a bite out of power costs!

V-Belts by

put cost-cutting teeth in your V-Belt drives with DAYTON COG-BELTS

40% MORE H.P. PER BELT **FEWER BELTS**

FEWER PULLEY GROOVES **LONGER BELT LIFE**

There's a whale of a saving in power transmission costs when you use the premium Dayton Cog-Belt! It delivers 40% more h.p. than an ordinary V-Belt. Here's why—

Cog-Belts are built to bend—like your finger—to take up compression strains as the belt goes round the pulleys. Results: Less strain, less heat, less stretch, less maintenance, longer life, less down-time.

Save on the cost of original belting! You need fewer belts, fewer pulley grooves to do the job, when 5 Dayton Cog-Belts do the work of 7 ordinary V-Belts,—and do it better!

Save drive-space, plant space! Cogs permit much shorter center-to-center distances—up to 25% shorter. They save up to 47.2% in drive area.

To end your V-Belt troubles for the long "duration" ahead, give your Dayton Distributor the "high-sign" of better V-Belt power transmission: the arched finger that means Dayton Cog-Belts and important savings!

*T.M.

DAYTON RUBBER COMPANY • DAYTON 1, OHIO

TAKE A TIP FROM A TIPPLE

14 years ago a set of Dayton Cog-Belts went to work, running the tipple at a coal mine at Logan, W. Va. These same veteran Cogs are still on the job! The mine superintendent predicts that they are good for years to come. If you have a drive that's a real toughie, turn it over to a team of Dayton Cog-Belts, for a long, trouble-free life!

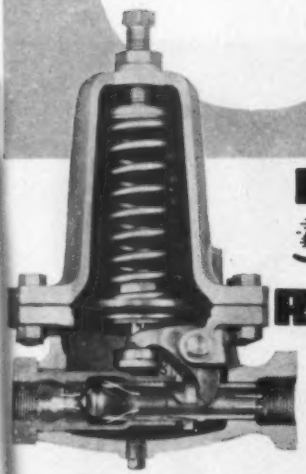
Dayton Rubber

WORLD'S LARGEST MANUFACTURER OF V-BELTS

EXTRA LARGE CAPACITY
TIGHT CLOSING CHARACTERISTICS
CLOSE DELIVERY PRESSURE CONTROL
WIDE RANGE OF ADJUSTMENT

Combine to Give You..

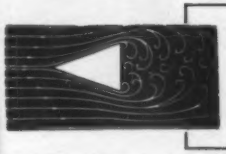
SMOOTH OPERATION
SPEEDIER PRODUCTION
NO SPOILAGE



CASH STANDARD *Streamlined* TYPE 1000 PRESSURE REDUCING VALVES

The "1000" valve is single seated and its valve makes line contact with its seat ring which accounts for its tight closing characteristics. The unusually long diaphragm spring insures sensitive pressure control.

Steam, water, air, oil, etc. flow through this valve in a straight line—nothing is in the path of flow to cause turbulence — therefore, peak flow is never a problem.

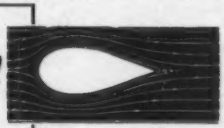


TURBULENCE LIKE THIS *Eliminated*

The inner valve is streamlined — no back eddies to hinder flow — valuable when you want all possible fluid to go through the valve to meet peak demand.

Turbulence eliminated by venturi approach to the valve seat — it means better flow. The inlet pressure is confined to a small cylindrical chamber, the same being advantageous for high pressures.

YOU GET THIS *Streamlined* PATTERN

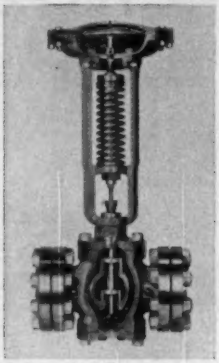


Write for bulletin "1000" that fully explains the cost-saving benefits that begin with installation and last for years.

CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

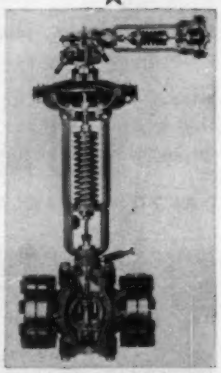
OTHER VALVES *from the* CASH STANDARD LINE



Cash Standard Type 34 Pressure Reducing Valve. For practically all fluids. Has roller bearing, also roller guides that kill side strains and stop packing trouble —no lost motion.

Sizes: ½" to 12" inclusive Highest initial pressure 800 lbs.: reduced pressure vacuum to 150 lbs. Bodies: iron, bronze, steel. Trim: iron, bronze, stainless steel. Ends: screwed, flanged, ammonia type, welding type. Bulletin 960.

☆



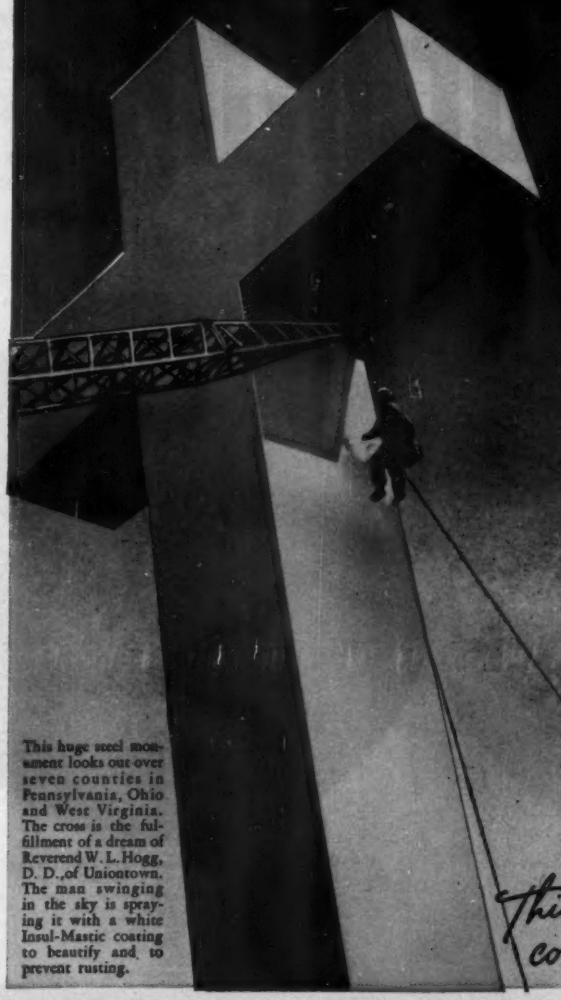
Cash Standard Type 30-AP Valve gives precise control of fluid pressures, through a pilot connected to the pressure under control. For steam, water, air, and most fluids.

Can be a pressure reducing valve or a back pressure valve depending on the way the control lines are connected. Pressures up to 600 lbs. Sizes ½" to 12" screwed; 1" to 12" flanged ends; wide variety of metals.

☆

INSUL-MASTIC Coatings

As Spectacular as the jobs they serve



This huge steel monument looks out over seven counties in Pennsylvania, Ohio and West Virginia. The cross is the fulfillment of a dream of Reverend W. L. Hogg, D. D., of Uniontown. The man swinging in the sky is spraying it with a white Insul-Mastic coating to beautify and to prevent rusting.

All Insul-Mastic coatings are homogenized and are manufactured with two particular objectives; to resist all corrosive agents ... from moisture to acids ... and to have exceptionally long life. In addition to these qualities, certain Insul-Mastic coatings contain cork and are excellent insulators. Other uses for Insul-Mastic are vaporsealing thermal insulation and moisture sealing building walls.

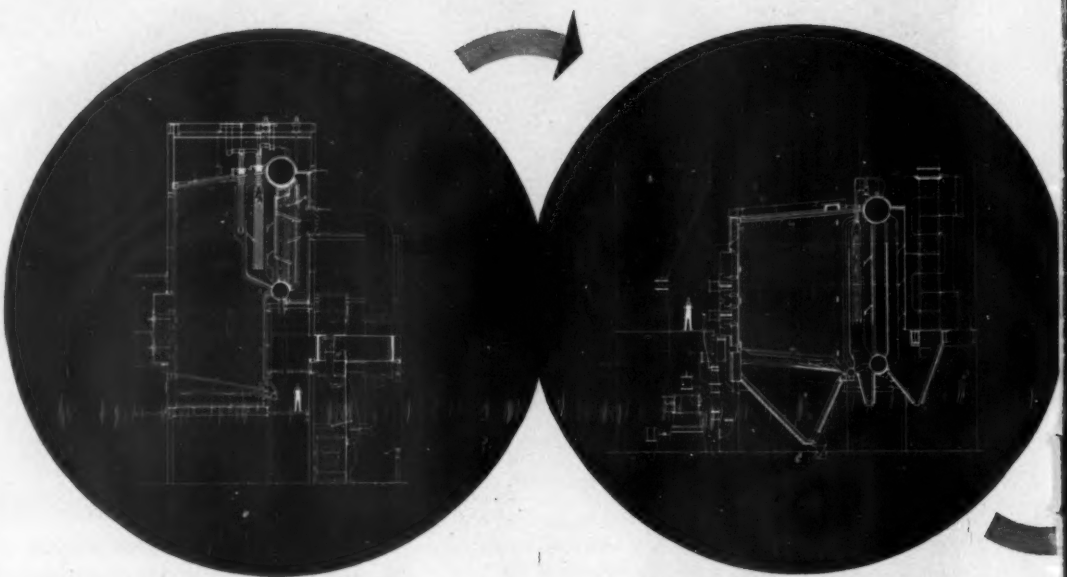
Insul-Mastic's outstanding quality is the reason for its place on the most spectacular ... and exacting ... projects where protection of metal, masonry or insulation is important.

Write for complete information and the name of our nearest representative.

Think first of the coatings that last!

Insul-Mastic Corporation
OF AMERICA
1163 OLIVER BUILDING · PITTSBURGH 22, PA.
Representatives in Principal Cities

Are VU Boilers habit forming?



VU-50 Boiler fired with oil. The capacity of the unit shown is 350,000 lb of steam per hour; operating pressure—920 psi; total steam temperature—905 F.

VU-50 Boiler fired with pulverized coal. The capacity of the unit shown is 150,000 lb of steam per hour; operating pressure—625 psi; total steam temperature—760 F.

COMBUSTION ENGINEERING

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

The record shows that they are. More than 100 companies . . . large and small . . . throughout this country and abroad . . . have ordered VU units more than once. Nearly half of these have ordered more than twice. Some as many as 5 or 6 times.

Considered in light of the fact that Vertical-Unit Boilers have never been — nor are likely to be — the cheapest you can buy, such a record becomes even more significant.

Here are just a few examples of the many industries that appear to have formed the VU habit.

A Steel Company now has a total of eleven VU Units in three different plants. Starting with an initial installation of three units in 1940, it has reordered twice; three units for a second plant in 1946 and five units for a third plant in 1950.

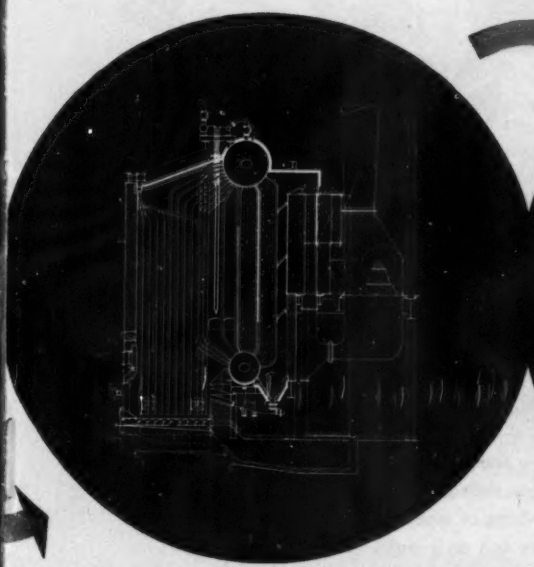
An Electric Utility Company started using the VU in 1944 when two units were installed at one of their power stations. When the capacity of this station was increased in 1948 two more units were installed. In 1947 this company ordered two more units for another of its stations.

An Oil Company ordered its first VU in 1937, its second in 1938. In 1942 another VU was installed and still another in 1944.

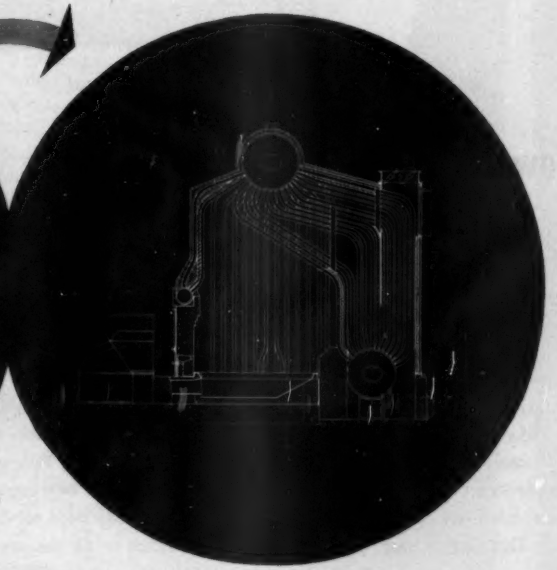
An Aluminum Company is another consistent buyer of VU Units. Since installing its first VU in 1940, it has reordered four times, and now has five C-E Vertical-Unit Boilers in service.

* * *

Just a small sample to be sure, but one that can be repeated over and over for other industries and other companies . . . companies that have ordered and reordered VU Boilers . . . companies that have the "VU habit" and find it highly profitable. B-511



VU-50 Boiler as adapted for firing bagasse on a C-E Spreader Stoker. The capacity of the unit shown is 75,000 lb of steam per hour; operating pressure—160 psi; total temperature—530 F.

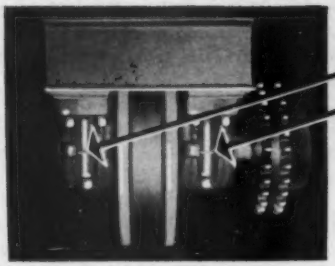


VU-10 Boiler fired with C-E Skelly Stoker. VU-10 Boilers range in capacity from 10,000 to 60,000 lb of steam per hour. They may be fired by underfeed, spreader or chain grate stokers or by oil or gas.

— SUPERHEATER, INC.

200 MADISON AVENUE, NEW YORK 16, N. Y.

C-E



Strobel & Salzman, Engineers
Petroff & Clarkson, Architects

Now an aircraft hangar with a zipper on 32 pillow blocks by SKF

Here's the newest development in equipment for fast, time-saving, cost-cutting turnaround maintenance, inspection and emergency repairs for commercial aircraft. It's the Mitchell Mobilhangar, built in two parts. Taxi aircraft into position—push-button controlled motors close the equipment to provide all the facilities of a fully equipped hangar. The "Mobilhangar" has every facility for servicing aircraft of any size. Tracks for it can be laid easily anywhere. Opening and closing operations are made smooth and easy by means of trucks equipped with 32 SKF Spherical Roller Bearing Pillow Blocks—a wise choice based on confidence in SKF's ability always to help put the right bearing in the right place; a wise choice because, wherever and whenever these pillow blocks may need servicing or replacement, there's an SKF Distributor near who is thoroughly qualified to do the job and do it right.

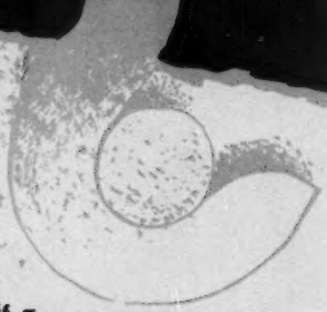
7215-A

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity
craftsmanship
metallurgy
tolerance control
surface finish
product uniformity
engineering service
field service

SKF
BALL AND ROLLER BEARINGS
AND PILLOW BLOCKS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of SKF *and* HESS-BRIGHT *bearings.*



"dag" Colloidal Graphite Lubricates at the Temperature of Molten Metal

"Dag" colloidal graphite dispersions have an almost unlimited resistance to heat. At 500° F. where ordinary lubricants begin to gum up and fail . . . and even up to 5000° F. in inert atmospheres . . . **"dag"** dispersions overcome friction and keep parts lubricated for action.

In deep piercing operations, the use of **"dag"** dispersions means a smooth product, and reduced die damage. Scaling and sticking are minimized in forging. Tearing and rippling are reduced in stretch-forming. In wire-drawing, diameters are truly uniform, and die life is greatly extended. In casting, parting is easier . . . surfaces smoother.

Colloidal graphite is a solid lubricant, softer than talc. Its tiny tile-like particles slip on one another with amazingly little friction as a result of the particular arrangement of their atoms. The film formed by an application of colloidal graphite is microscopically thin, but far more durable than lubricating oil films. It is not subject to rupture except under conditions of heavy prolonged abrasion.

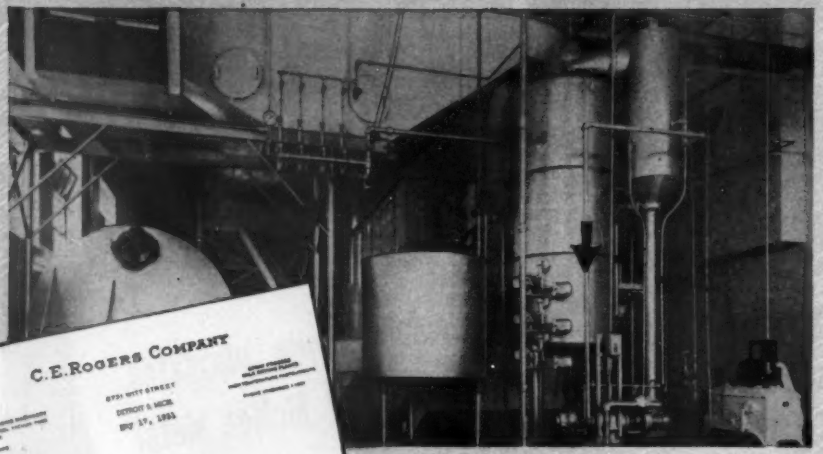
An interesting brochure on **"dag"** Colloidal Graphite for all Metalworking Operations is yours for the asking. Write today for Bulletin 426-22L

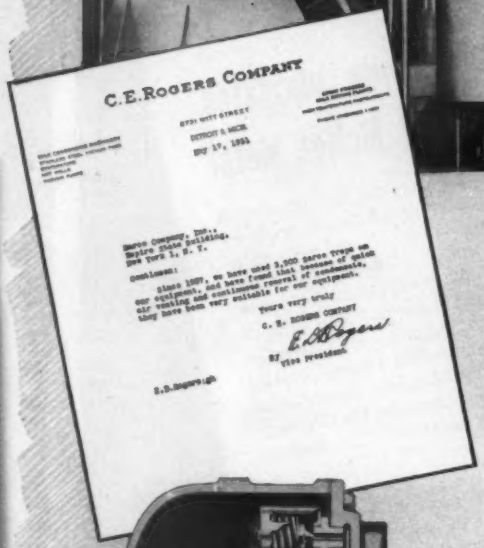
dag DISPERSIONS®

Acheson Colloids Corporation, Port Huron, Michigan

. . . also Acheson Colloids Limited, London, England

"Continuous Removal of Condensate"





C.E. ROGERS COMPANY

DETROIT 6, MICH.

Nov 17, 1951

Sarco Company, Inc.,
Empire State Building,
New York 1, N. Y.

Gentlemen:

Since 1883, we have used 3,000 Sarco Traps on our equipment, and have found that because of quick air venting and continuous removal of water they have been very suitable for our equipment.

Yours very truly

C. E. ROGERS COMPANY

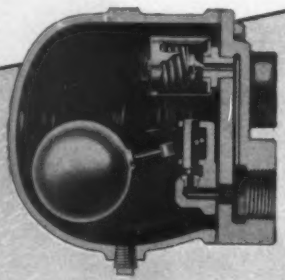
By E. E. Rogers
Vice President

E.E.Rogers:gh

Six Sarco Float-Thermostatic Steam Traps, type FTL on vacuum pan for condensed milk. With 26" of vacuum and 5 psi steam pressure this pan can evaporate 32 lbs. of water per square foot of heating surface. At top, left center, four Sarco high pressure float-thermostatic traps, type FTH, draining fin type air heaters on spray drier. The quality of Sarco products is reflected in the efficiency of the equipment they serve.

The Rogers family of Detroit, back in 1883, pioneered the vacuum pan and ever since has been a leader in the manufacture of quality equipment for condensing and spray drying milk.

Realizing early that rapid heat transfer was essential to obtaining maximum capacity with minimum steam consumption, they patented a steam coil design providing a separate condensate discharge for each turn of every coil.



Sarco Float-Thermostatic Steam Trap. Large capacity at minimum pressure-differential. Air binding is impossible. Available in six sizes for pressures to 200 psi.

SARCO FLOAT-THERMOSTATIC STEAM TRAPS

fitted to these outlets, get rid of the condensate continuously, as fast as it forms. The built-in Sarco air vent prevents air and non-condensables from retarding heat transfer.

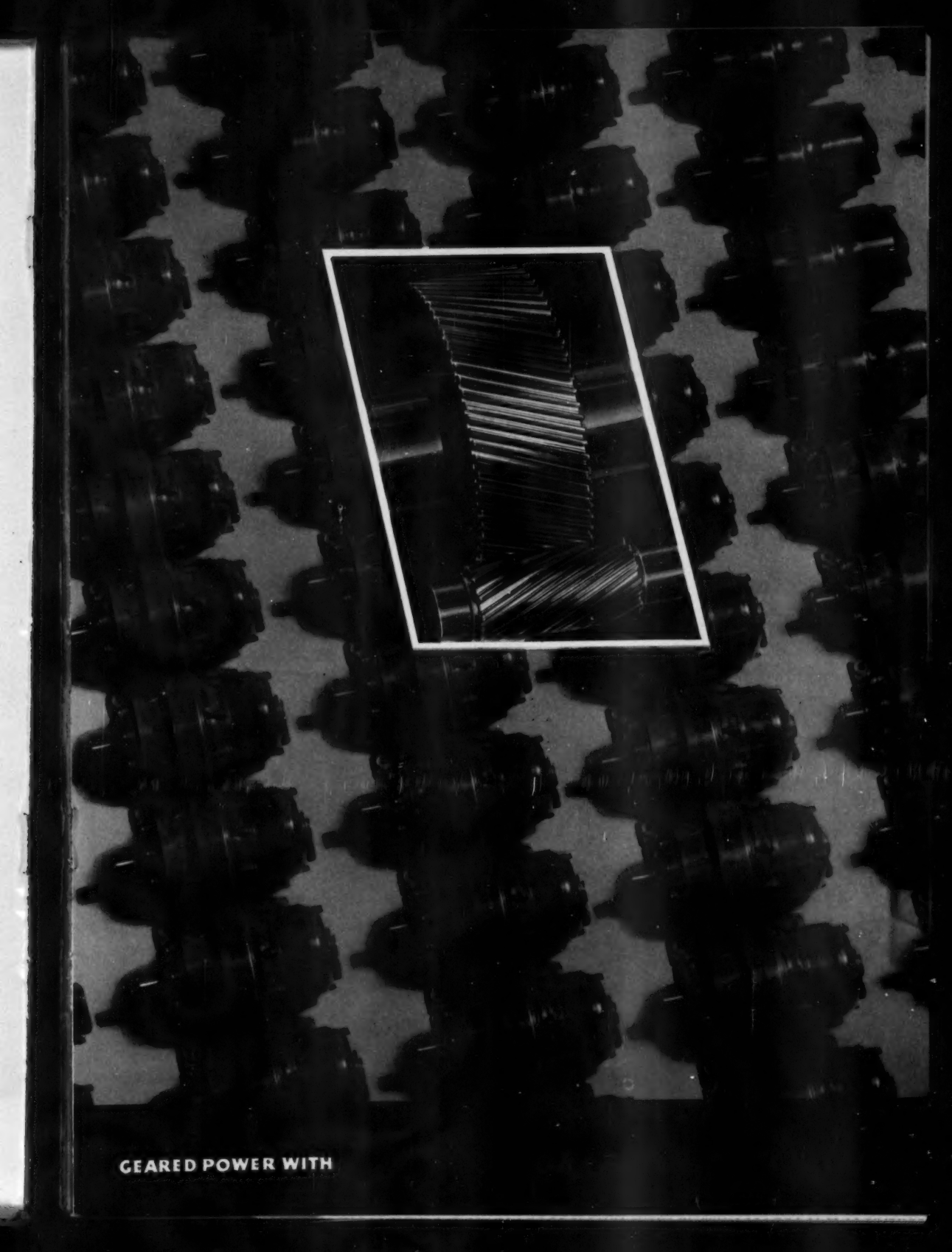
Ask for new Bulletin 453

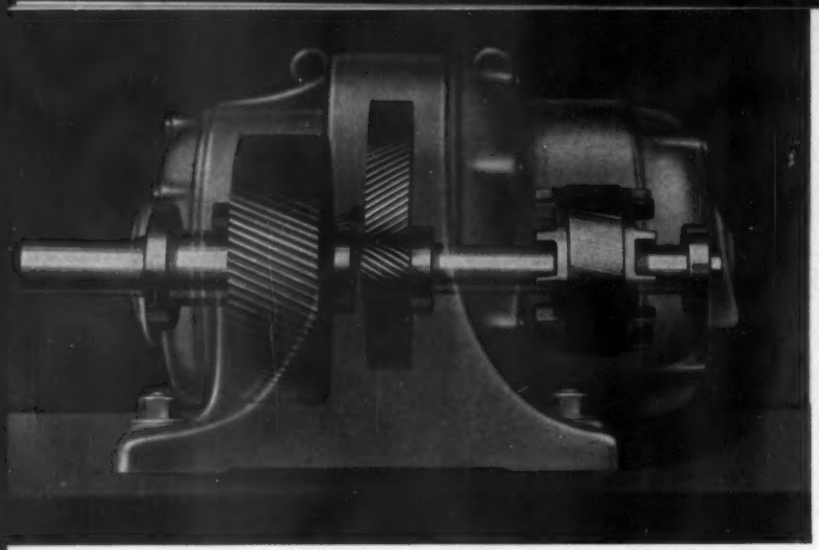
SARCO COMPANY, INC.

EMPIRE STATE BUILDING, NEW YORK 1, N.Y.
SARCO CANADA LTD., TORONTO 5, ONTARIO

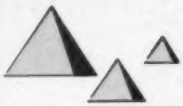
REPRESENTED IN PRINCIPAL CITIES

352


GEARED POWER WITH



BUILT-IN GEARED POWER WITH PYRAMIDAL STABILITY



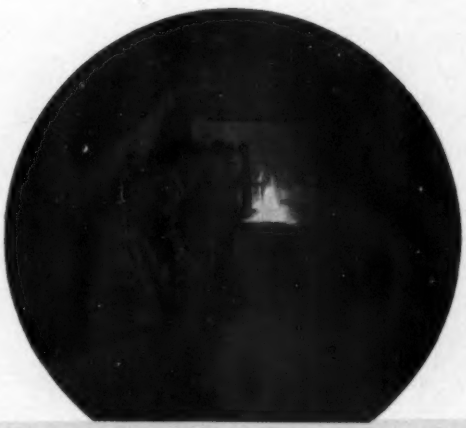
U. S. SYNCROGEAR MOTOR

Modern industry requires electric drives of high torque, low speed output. Ordinary electric motors are best fitted for low torque, high speed power conversion. The solution is found by the ideal combination of an efficient, compact, high speed motor with torque multiplying, built-in gearing. Successful design must provide for multiplied torsional forces; stresses must be supported by a non-yielding, permanently rigid member; gears must precisely match forever; all castings must maintain their original accuracy. In the *U. S. Syncrogear* these recognized engineering fundamentals are combined.

ALL CASTINGS NORMALIZED

GEARS HARDENED TO 45/50 ROCKWELL C

Just as green lumber will warp and distort, so will an unseasoned iron casting. Even a slight skew or warp can throw a bearing out of alignment a few thousandths inch and impose excessive stress where mechanical perfection is most needed. This extra stress on the bearing can diminish its life in terms of years. All U. S. Motor castings are normalized, which not only avoids uninvited motor stresses, but helps maintain the original air gap between rotor and stator. Gears are precision hobbed, shaved and hardened to Rockwell 40/50 for long life and quiet action.

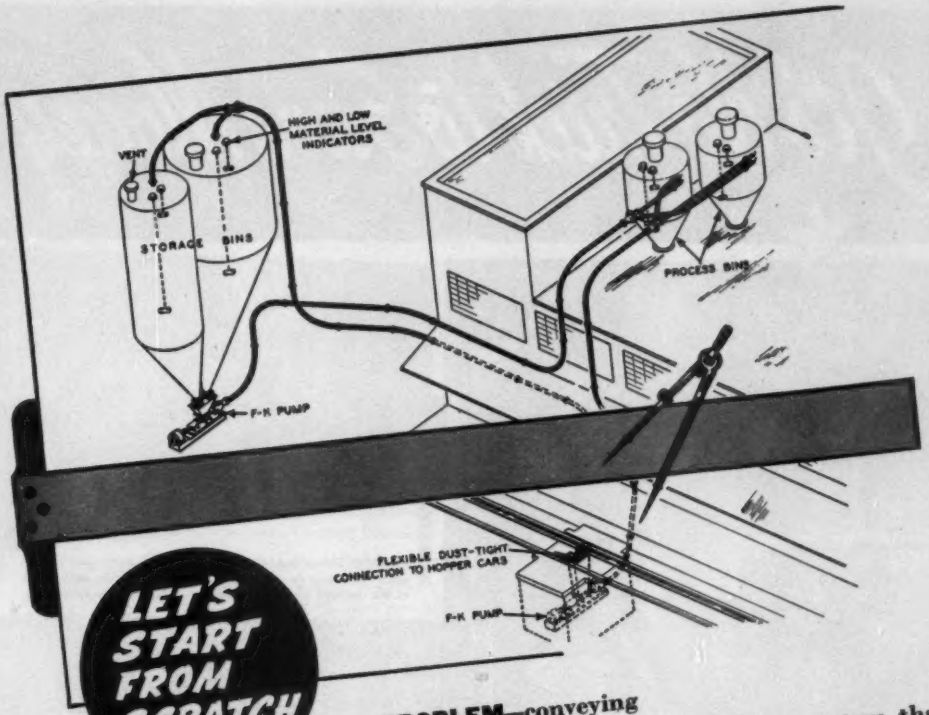


Ask for Bulletin 1543, illustrating and describing the complete line of U. S. Motors

U.S. ELECTRICAL MOTORS Inc.

PACIFIC PLANT: Los Angeles 54, California **ATLANTIC PLANT: Milford, Connecticut**

Atlanta 3, Ga.; Bakersfield, Calif.; Boston 16, Mass.; Chicago 8, Ill.; Cincinnati 16, Ohio; Cleveland 14, Ohio; Dallas 9, Texas; Detroit 2, Mich.; Fresno 1, Calif.; Houston 4, Texas; Indianapolis 4, Ind.; Milwaukee 2, Wisc.; Minneapolis 2, Minn.; New York City 6, N. Y.; Philadelphia 2, Pa.; Pittsburgh 2, Pa.; San Francisco 7, Calif.; Seattle 4, Wash. » » » » *Distributors and Agents in all principal cities.*



LET'S START FROM SCRATCH

PROBLEM—conveying

SOLUTION—to design and build a system that will meet your requirements, better your operation

Fuller Company occupies an unique position in the field of pneumatic conveying of dry pulverized and granular materials. It designs and manufactures four primary types, from which it can select that best adapted to specific requirements; in other words, equipment best suited to do the work most efficiently and economically, with the materials to be handled.

Each job should be considered separately. That's why we say, "Let's start from scratch" . . . when the plant is in the design stage. A preliminary study should be made of local conditions, so that proper equipment can be recommended. The selection of the type of equipment, and its layout, best adapted to satisfy any individual set of conditions, should be made by specialists of wide experience in the engineering of pneumatic conveyors. We strongly urge all prospective purchasers to avoid the preliminary engineering, but to permit us to submit a recommendation, or engineering study, comprising a proposal drawing and estimate for your approval, or the approval of your consulting engineers.

Fuller Company has a tangible resource in the years of experience and training of its personnel in all phases of pneumatic conveying. Its engineers are at your service, ready to make studies of your requirements, and suggest means for the betterment of your operation. You're under no obligation for this service.

FULLER-KINYON

AIRVEYOR

FULLER-FLUXO

F-H AIRSLIDE

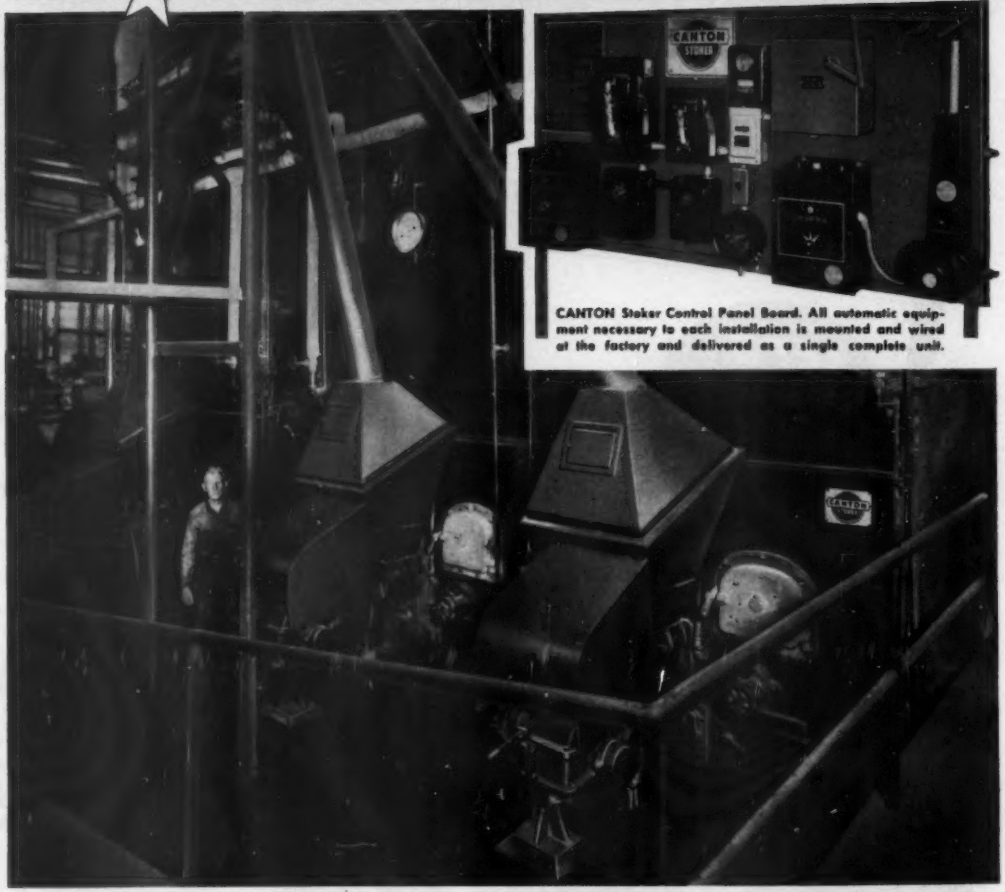
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS, AND ASSOCIATED EQUIPMENT

G-67

Fuller

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

It's No Trick to Save Money



CANTON Stoker Control Panel Board. All automatic equipment necessary to each installation is mounted and wired at the factory and delivered as a single complete unit.

Multiple installation of CANTON Vulcan Ramfeed Stokers under 300 HP Water Tube Boilers at Utah State Capitol Bldg., Salt Lake City, Utah.

CANTON

SINCE 1910

...with a GOOD STOKER!

CANTON STOKERS

During the past forty years, thousands of users have learned that the superior construction and operating features of Canton Stokers provide worthwhile savings. Their dependable and efficient operation is backed by forty years' experience in designing and manufacturing quality stokers with outstanding advantages.

★ Every Canton Stoker is mechanically designed and engineered to give the highest possible operating efficiency for the specific installation in which it will be used.

★ All component parts of Canton Stokers are made of the finest materials—designed, manufactured, assembled, and tested under the rigid Canton "quality-production" policy.

★ Canton manufactures 54 types and sizes of Ramfeed and Wormfeed Stokers to supply a broad range of application requirements. Ramfeed Stokers are equipped with either single or double side-dumping Ash Plates. Wormfeed Stokers are supplied in either dead-plate or side-dumping types.

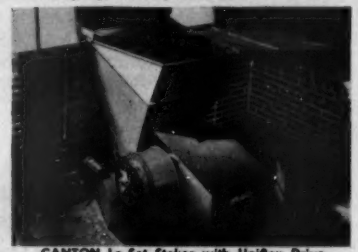
★ Canton maintains a complete stoker service and parts organization, available any time, anywhere to assure operators a minimum of "down-time" for their stoker equipment.

In addition, the "plus" advantages of substantial fuel and labor savings made possible with Canton Stokers will demonstrate why thousands of users are "sold" on Canton Ramfeed and Wormfeed Stokers for all types of power generating and heating plants.

CANTON STOKER CORPORATION
Andrew Place, S. W., Canton, Ohio
CANADIAN REPRESENTATIVE: Volcano Ltd., 743 Mountain Street, Montreal 3, Quebec
EXPORT DIVISION: W. B. Harkins, 751 Drexel Building, Philadelphia 6, Pa.

For detailed information on Canton Stokers, call or write the Canton Stoker representative nearest you or Canton Stoker Corporation, 741 Andrew Place, Canton 1, Ohio. *Bulletins on Request.*

Overhead-feed installation of three CANTON Vulcan Ramfeed Stokers at the Magnavox Company, Fort Wayne, Indiana.



CANTON Lo-Set Stoker with Uniflex Drive showing Synchronized Combustion Control connections, Victor Silk Hosiery Mills, Doylestown, Pa.

Battery of four CANTON Duraflex Wormfeed Side-Dump Stokers at U. S. Post Office, Buffalo, New York.

CANTON RAM FEED STOKER DRIVE MECHANISMS ARE GUARANTEED FOR FIVE YEARS

STOKER

CANTON STOKER CORP. CANTON 1, OHIO

pennsylvania company solves TOUGH water hose problems

Splattering food juices in a large Pennsylvania Cannery quickly deteriorated ordinary washdown hose. The hose covers turned flabby and scraped off on concrete floors. The exposed carcasses wore out prematurely with the destruction accelerated when workmen kinked the hose to control flow. All this cost time and money.

Could the problems be solved?

Republic's local Distributor thought so, and suggested a test run with Republic's Fairway Water Hose ... no custom-built hose necessary.

That test, begun 15 years ago, is still going on because the hose never wore out!!! The workmen are more efficient with the easy-handling Fairway Hose, and the company (now a confirmed Republic customer) is tickled to death since eliminating hose repair and replacement costs

Fairway Hose, available in all standard sizes in 50 ft., 100 ft. or long production lengths on reels or in bales, is just one of the many Republic Rubber Products designed for rugged duty in your plant.

For a free analysis of your requirements, simply mail your request to Republic Rubber Division, Youngstown, Ohio

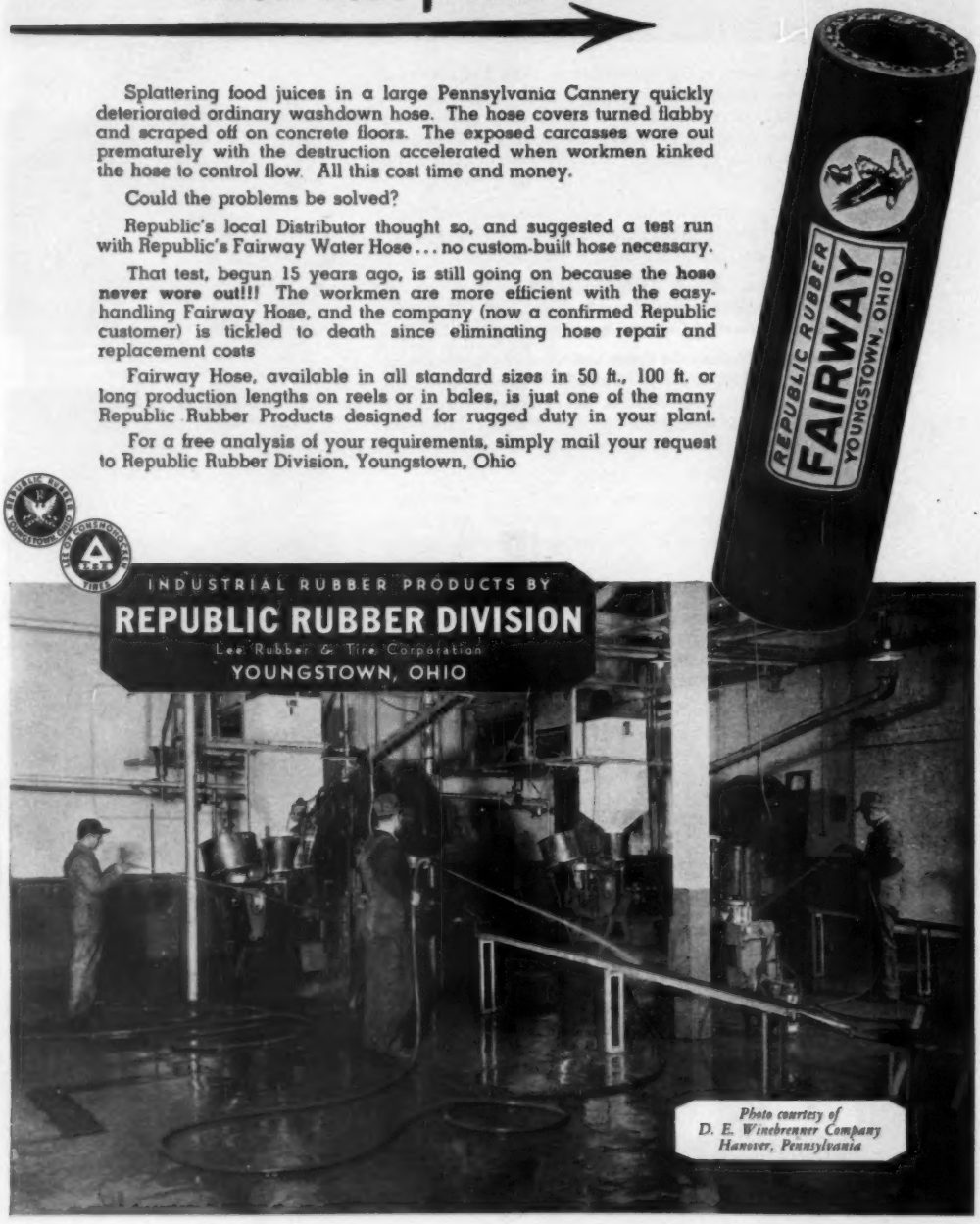
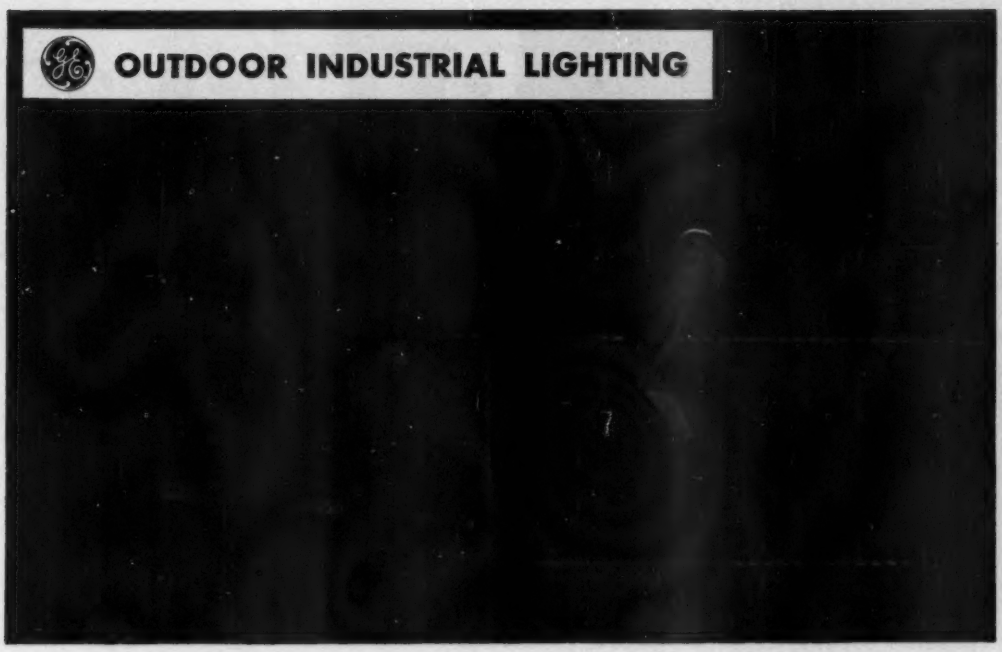


Photo courtesy of D. E. Winebrenner Company Hanover, Pennsylvania

OUTDOOR INDUSTRIAL LIGHTING



Inadequate lighting such as this makes it difficult to guard your plant boundaries properly. For a moderate investment most plant protective lighting systems can easily be modernized and made much more effective.

Now, plug up the loopholes in your outdoor lighting

A continuous, well-planned system can double the protection offered by fences and walls. Plan now to give your plant the protection of a complete lighting system.

As the need for protection increases, as you move back into two- and three-shift schedules, a modern outdoor lighting system becomes more and more important to your production picture.

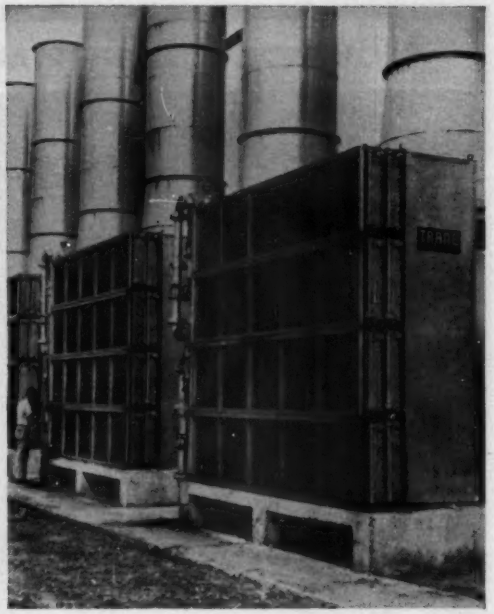
FOR PROTECTION, investigate the low-cost benefits of a soundly planned protective lighting system. New techniques, new types of fixtures, or minor adjustment of your present equipment can bring your lighting up to date for a very moderate investment.

FOR SAFETY in handling outdoor traffic, look into today's techniques of improved area lighting for loading platforms, docks, parking facilities, and roadways.

FOR INFORMATION on outdoor lighting, contact the lighting specialist at your local G-E office, or write for the free bulletin, "Outdoor Lighting for Industrial Plants." Address Section 451-165, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

451-165



Laboratory . . . Reduction Plant . . . Assembly . . . Dock . . . Service Station

Trane Air Conditioning Serves Everywhere in Industry

Industries of every kind and size are finding the answers to their heating and air conditioning problems in the broad Trane line.

Constant Temperature Fog Room—A cement manufacturer wanted to test concrete specimens under extreme humidity conditions, at constant temperatures. Trane Climate Changers kept the test room at 73° constantly the year around.

To Cool Gas Engines—The location of a new aluminum reduction plant in the south had plenty of natural gas and good transportation. But there was no water to cool the 120 1800-hp engines used for power. This situation was remedied when 120 Trane Fluid Coolers were installed to keep jacket water at just the proper temperature.

Window Blanketing — The windows in the new plant of a scale manufacturer admitted plenty of light to a delicate assembly line. But the great glass area created greater possibilities for drafts. That is until Trane Wall-Fin Heaters were installed to blanket the windows with heat without obscuring the light.

Washing the Walls with Heat — Long loading docks, like the one in a Michigan chemical plant, call for a lot of heat to combat the cold air from constantly opened doors. A battery of Trane Horizontal Unit Heaters wash the exposed walls and blanket the doorways with all the heat that's needed.

Tempering Freezing Air — The diesels of a famous railroad discharge a lot of gas-laden air as they enter a terminal service station. As the bad air is exhausted, clean outside air is brought in and heated with Trane Nonfreeze Heating Coils.

Whether it's laboratories, reduction plants, assembly, docks or service stations, Trane air conditioning serves industry everywhere.

Whatever your factory heating, ventilating, cooling or air conditioning problem, look for the answer in the complete Trane line.

In Assembly Departments—Trane Wall-Fin Heaters are tucked up under the girders.

In Loading Areas—Trane Horizontal Propeller Unit Heaters kill drafts before they start.

In Service Stations—Cold outside air is heated with Trane Coils before it is used for ventilation.

TRANE

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

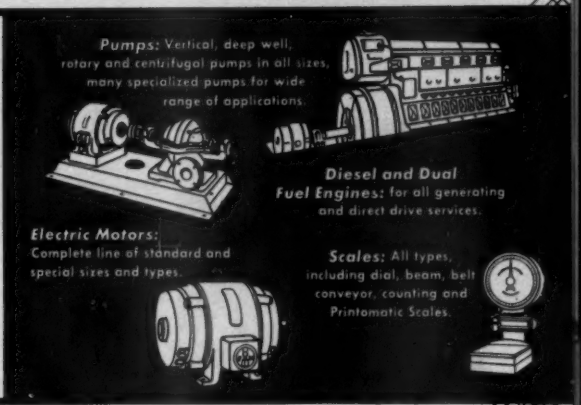
THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pennsylvania
Trane Company of Canada, Ltd. . . . Toronto
OFFICES IN 80 U. S. and 14 CANADIAN CITIES

FOR ACTION

CALL YOUR FAIRBANKS-MORSE SALES CENTER

You can minimize procurement problems these days by depending upon your local Fairbanks-Morse Sales Center as a common source for the bulk of your requirements for electric motors, pumps, scales and diesel engines.

Fairbanks-Morse Sales Centers are staffed by factory-trained sales and service engineers who offer prompt and valuable application assistance for all Fairbanks-Morse products—as well as fast repair parts service to keep your old equipment going at top efficiency. For where to call—see the list below.


Pumps: Vertical, deep well, rotary and centrifugal pumps in all sizes, many specialized pumps for wide range of applications.
Diesel and Dual Fuel Engines: for all generating and direct drive services.
Electric Motors: Complete line of standard and special sizes and types.
Scales: All types, including dial, beam, belt conveyor, counting and Printomatic Scales.

FAIRBANKS-MORSE

A NAME WORTH REMEMBERING

THESE ARE YOUR FAIRBANKS-MORSE SALES CENTERS

ATLANTA 3, GEORGIA
760 Lee St., S. W.
AMhurst 7701

BALTIMORE 18, MD.
659 E. 25th St.
BElmont 5258

BIRMINGHAM 1, ALA.
626 N. Ninth St. Zone 4
3-6546

BOSTON 10, MASS.
178 Atlantic Avenue
LAfayette 3-3600

BUFFALO 3, N. Y.
33 Franklin St.
Lincoln 4210

CHARLOTTE 2, N. C.
Liberty Life Bldg.
Room 605
6-2893

CHICAGO 5, ILLINOIS
1550 S. State St.
HArrison 7-7100

CINCINNATI 2, OHIO
49 Central Avenue
MAin 3010

CLEVELAND 14, OHIO
3000 W. 117th St.
Clearwater 1-3300

COLUMBUS 8, OHIO
1034 Goodale Blvd.
WAlnut 8581

DALLAS 2, TEXAS
1713 N. Market Street
CEntral 4347

DENVER 2, COLO.
1500 17th Street
TAbor 6241

DES MOINES 17, IOWA
2017 Dean Avenue
6-1189

DETROIT 13, MICHIGAN
11110 East Warren Ave.
VAlley 1-7100

DULUTH 2, MINN.
Board of Trade Bldg.
2-7538

HOUSTON 13, TEXAS
5521 Navigation Blvd.
WAyside 2159—(LD 506)

INDIANAPOLIS 2, IND.
1499 N. Harding St.
FRanklin 3684
ATlantic 3092

JACKSONVILLE 6, FLA.
930 East Adams St.
5-6473

KANSAS CITY 7, MO.
1300 Liberty Street
Victor 6474

LOS ANGELES 11, CALIF.
4535 S. Soto Street
JEfferson 8151

LOUISVILLE 8, KY.
2008 So. Brook St.
CAlhoun 1469

MEMPHIS 7, TENN.
676 Jefferson Ave.
5-1614

MILWAUKEE 3, WIS.
404 N. Plankinton
DAly 8-0180

MINNEAPOLIS 15, MINN.
417 S. Fourth Street
MAin 4353

NEW ORLEANS 13, LA.
1000 St. Charles Ave.
RAymond 3115

NEW YORK 4, N. Y.
80 Broad St.
HAnover 2-7470

OMAHA 8, NEBRASKA
902 Harney St.
ATlantic 3122

PHILADELPHIA 8, PA.
401 N. Broad St.
WA 2-4100

PITTSBURGH 24, PA.
4301 Main Street
SCheniey 1-3123

PORTLAND 14, OREGON
105 S. E. Taylor St.
EAst 0131

PROVIDENCE 3, R. I.
187 Pine Street
GAspee 1-1531

ST. LOUIS 2, MO.
217 South Eighth St.
CHestnut 7483

ST. PAUL 1, MINN.
220-26 E. Fifth Street
GArfield 4335

SALT LAKE CITY 1, UTAH
153 W. Second South St.
3-2108 & 3-5139

SAN FRANCISCO 7, CALIF.
630 Third Street
EXbrook 2-5855

SEATTLE 99, WASH.
Salmon Bay Terminal
ALder 6600

STUTTGART, ARK.
403 South Main St.
185

TULSA 3, OKLA.
1335 Hunt Bldg.
3-8231

WASHINGTON 5, D. C.
1000 Vermont Ave., N. W.
District 6694

FAIRBANKS-MORSE de MEXICO S. A.
Balderas 146, Mexico 1, D. F. Mexico
10 06 74 y 10 09 58

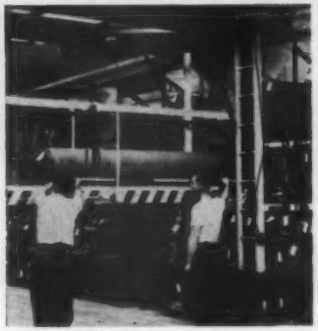
Export Division:
NEW YORK 4, N. Y.
80 Broad Street—HAnover 2-7470

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Bridge-Cranes Help Move Carpets

BRIDGE-TYPE cranes are supplying the materials handling muscles in this carpet warehouse. Full carpet rolls are placed on cradles and can be rolled into compartments from crane with a minimum of effort.

Should a certain piece of carpet be desired, the full carpet is rolled onto the bridge-crane. The crane and carpet are then lowered to the ground. Since the bridge-crane is equipped with rollers, the carpet is unrolled and the desired piece cut from the roll without removing the carpet from the cradle. *From Mohawk Pow Wow, a publication of Mohawk Carpet Mills, Incorporated, Amsterdam, New York.*



Bridge-type crane does the heavy work of moving full carpets into compartment

Two-Way Radio Speeds Materials Handling

A FLEET OF radio-equipped plant vehicles, controlled from a central dispatcher, form the backbone of materials handling equipment at the Timken Roller Bearing Co., Steel and Tube Division Plant, Canton, O.

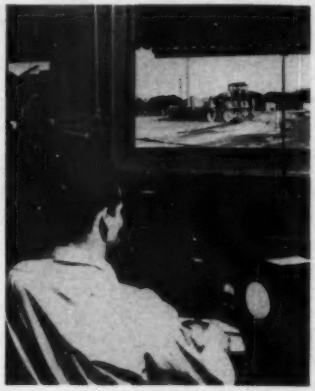
Twenty-four mobile units, including locomotive cranes, a jeep, fork trucks, and nine straddle-trucks are equipped with FM two-way radios in order to reduce movement time, eliminate dead-heading, improve control, and increase over-all operating efficiency.

The fleet of straddle-trucks hauls steel billets from the mill to storage points in the yards around the plant and return them when needed to the mills for further processing or shipping. There is a number of outdoor storage yards at distances from a few hundred feet to half a mile from the mills.

Before its installation, one man was assigned the job of just chasing down plant vehicles and giving the drivers orders from the dispatcher.

The dispatcher now has full authority to direct mobile equipment by use of the two-way radio equipment. He controls operations based on requests for movements telephoned to him by production control people in different parts of the plant.

In order to make sure the operations are carried out with maximum efficiency, a work recorder is installed on each radio-equipped vehicle. *From a news release of Motorola, Inc., Communications and Electronics Div., Chicago, Illinois.*



With the use of two-way radio, dispatcher controls movement of straddle-truck seen through window and 15 other vehicles about the plant area

By Improved Layout and New Equipment, Crating Department Cuts Costs and Does More Work

BY INSTALLING a radial arm saw in its crating department, the American Hospital Supply Co., Evanston, Ill., producers of hospital equipment and supplies, is able to handle a considerable amount of maintenance carpentry in addition to preparing crates for shipment.

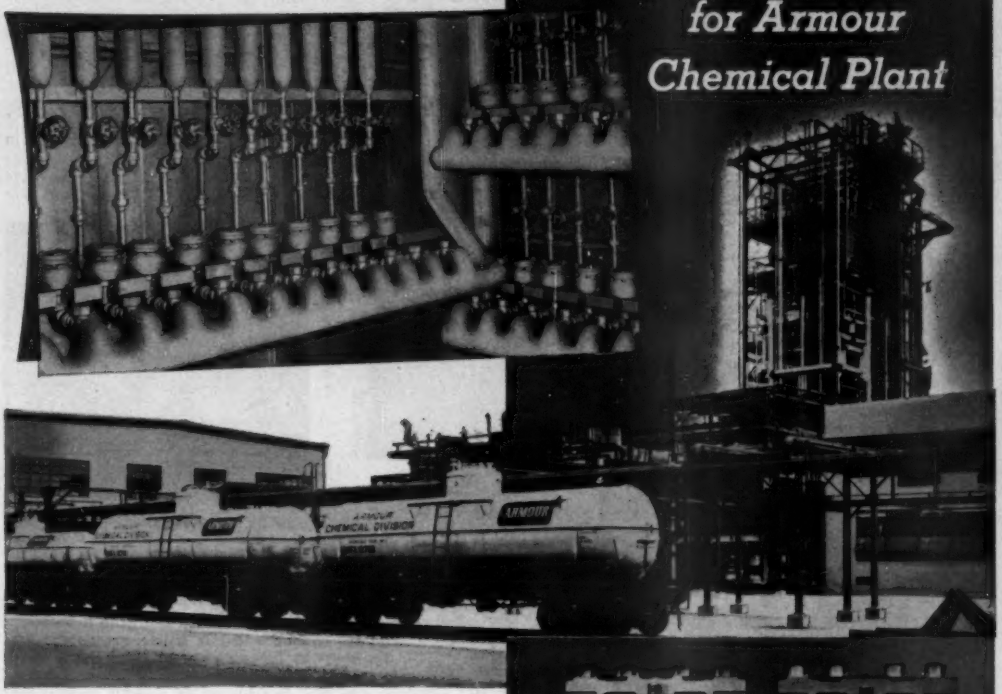
The crating department is realizing a cost-saving in several ways: All sawing operations are now done on a single machine; most crating and maintenance work can be done by one man, instead of two, as formerly; and the construction time per crate has been reduced substantially. In addition, wall space is now available for storage bin purposes, rather than for the installation of additional equipment.

The saw is installed in the center of a small room with wide swinging doors at each end. When opened, these doors permit the handling of extra long pieces of lumber with ease. *From Delta Power Tool Journal, a publication of Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee, Wisconsin.*

Multi-purpose saw cuts crating department costs and permits the company to do some of its maintenance carpentry work in addition to preparing shipping crates

NICHOLSON TRAPS SELECTED

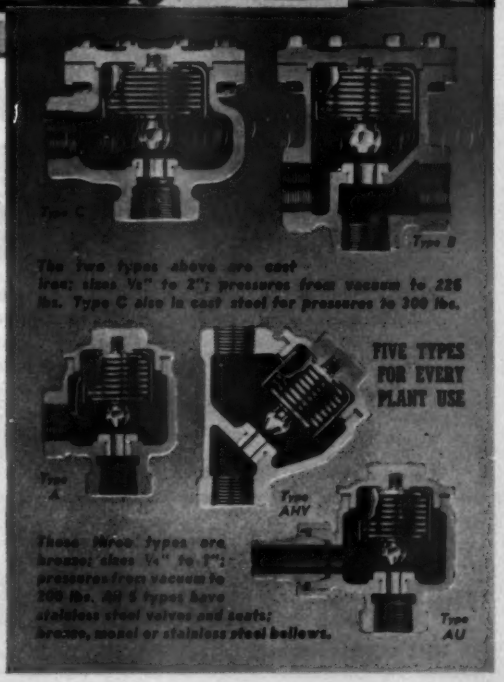
for Armour Chemical Plant



Above, new McCook, Ill., plant of Armour and Company's Chemical Division. Nicholson steam traps were specified throughout. Left above, a battery shown on tracer lines warming fatty acids.

Many chemicals are made available in commercial quantities for the first time by this new Armour Chemical Division plant. With demands for process steam alone as high as 80,000 pounds per hour, the entire plant is equipped with Nicholson steam traps, both grounds and buildings.

Features of Nicholson thermostatic steam traps: 2 to 6 times average drainage capacity; shorten heat-up time. Operate at lower temperature differential; fast action keeps equipment full of live steam. Maximum air-venting capacity. Freeze-proof. Types for every process, power, heat application.


Type C
Type B
The two types above are cast iron; sizes ¼" to 2"; pressures from vacuum to 225 lbs. Type C also in cast steel for pressures to 300 lbs.
FIVE TYPES FOR EVERY PLANT USE
Type A
Type AHV
Type AU
These three types are bronze; sizes ¼" to 3"; pressures from vacuum to 200 lbs. All 3 types have stainless steel valves and seats; bronze, monel or stainless steel bellows.

Send for **NICHOLSON TRAP CATALOG 751**

Catalog 751 contains capacity tables, installation diagrams, and data, charts and formulae for determining the proper size trap.

W. H. NICHOLSON & CO.

208 OREGON ST., WILKES-BARRE, PA.

Sales and Engineering Offices in 57 Cities

Railmaster 3-ton crane serves the paint shop area and interlocks via track curve with crane serving the sand blast room. Interlocking track is equipped with opener to allow fire door closure.

Track and switches with spur tracks over welding booths for easy spotting of heavy loads in booths.

Compact track and crane system over the electrical shop area. Note hand chain drop section on extreme left, which lowers a hoist carrier for service or repair.

MONORAIL REDUCES
Maintenance Costs

In this, one of the country's largest maintenance shops, American MonoRail Overhead Handling Equipment serves the entire department. Included in the department are: machine shop, electrical repair, metalizing room, welding, painting and sand blast room, pipe shop, and inside and outside storage. This plant has shown a definite increase in efficiency and a great reduction in handling costs.

Let an American MonoRail engineer show you how you can cut handling costs and save valuable floor space.

WRITE FOR C-1 BULLETIN

THE AMERICAN **MONORAIL** COMPANY

13123 ATHENS AVENUE ● CLEVELAND 7, OHIO

Improved Coupler-Handling Eliminates Steps, Saves Time

COUPLERS FLOW from box trucks to a convenient position on portable stand for welding to conveyor side rails since a suggestion of Clyde Colley and Oscar Lockwood was adopted. Formerly, couplers had to be removed from the box trucks and racked near the welders by hand. More than an hour is saved daily by eliminating this handling step.

A full box truck of couplers, a 2 weeks supply, is now hoisted up and laid on its side on a portable stand. A sliding cover on the box

Employee-suggestion improved on method of handling couplers and saves time

truck is then adjusted to regulate the flow of couplers to a detachable shelf where they are easily accessible for welding. Both the detachable shelf and box trucks are partitioned to keep right- and left-hand couplers separated.

In addition to being a time saver, this new method is much easier, as it eliminates stooping over to remove couplers from bottom of the box trucks. Mounting the box truck stand on casters allows heavy loads to be wheeled wherever needed, and permits exact positioning near the welding machines. *From The Rapid-Wheeler, a publication of the Rapids-Standard Co., Inc., Grand Rapids 2, Mich.*

Compressed Air Leaks Do Count

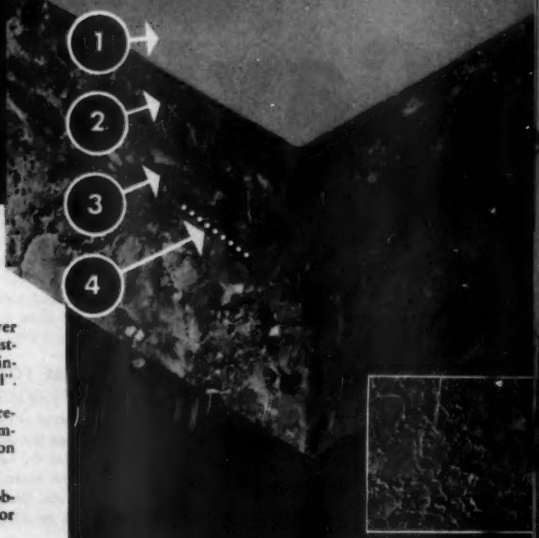
AIR LEAKS, unlike water, steam, or oil, normally can't be readily detected, particularly in noisy areas. When escaping air is discovered, it is often neglected with the argument that the leak is too small to be of consequence.

The undesirable leakage of compressed air can be attributed to a variety of causes, i.e., defective hose, improper maintenance, the use of valves and cocks on drain lines in preference to traps, and others.

Here are some facts which show the importance of correcting small leaks. An orifice 1/64 in. diameter, with air at 80 psi, dispenses 0.33 cfm. Suppose there are enough of these small leaks to add up to an opening

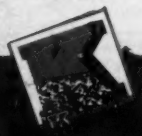
Absorption Control*

¼ of a billion square feet in use prove they are HARDER, TOUGHER, LONGER-LASTING



Study a **Kalman** *Floor*

1. **THE SURFACE** – Uniformly hard and smooth over every square foot. No "soft" or "weak" spots. Resistant to roughest wear and "dusting". Easy to maintain. Achieved by Kalman "Absorption Control".
2. **THE TOPPING** – A dense, compact mass. Aggregate is distributed evenly. Voids are almost completely absent. Achieved by Kalman "Absorption Control".
3. **THE AGGREGATE** – Hardest, toughest stone obtainable. Used in maximum quantity. Tested for gradation and crushing strength.
4. **THE COMPLETE ADHESION TO THE UNDERSLAB** – Correct preparation of the underslab plus Kalman "Absorption Control" assure *permanent* adhesion.



Kalman CONCRETE Floors

KALMAN FLOOR COMPANY, INC. 110 East 42nd Street, New York 17, N. Y.

R & M
MOYNO®
PROGRESSING-CAVITY
PUMP

No Pistons!
No Valves!
No Churning or Pulsation!

Won't Cavitate!

Moyno "progressing-cavity" pumping, with its *positive displacement and pressure*, delivers constant, uniform, steady flow on every type of service. What's more, it resists abrasives and chemicals—handles everything from liquids to pastes—keeps going on the tough jobs where *other* pumps have failed.

Moynos pump virtually anything—plaster, potato salad, gasoline, glue, hamburger, milk, tooth paste, citrus juices, liquefied gases, pottery clay . . . even *diamond dust in oil*. They self-prime, pass particles and solids in suspension, cut pumping costs and maintenance problems on job after job.

WORLD'S SIMPLEST

Here's the world's simplest pumping principle, and also the world's most versatile—a helical rotor rolling around within a double-helical stator. This forms "progressing cavities" (between continuous seal lines) which move materials *without agitation* at pressures to 1000 p.s.i.

SEE FOR YOURSELF

We'll be glad to tell you what Moynos are doing on work that's just like yours, for among the thousands already in use you'll find the same or similar service. Or, if your material is "different," we'll lab-test and *guarantee* output. Get all the facts on Moynos today.

Made in seven frame sizes. Capacities, 1 to 250 g.p.m. May be direct-connected to motor, belt-driven, or operated from a variable-speed drive for metering.

Multi-stage Moynos for higher pressures merely have longer pumping elements. Write for free Moyno Bulletin P-30-E.

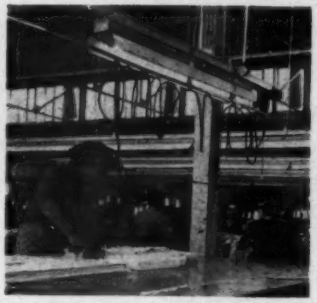
ROBBINS & MYERS • INC.
SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO
MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

½ in. diameter. Assuming the same pressure, air then escapes at the rate of 340 cfm.

No high powered accounting is necessary to arrive at the conclusion that leaks blow a lot of dollars into thin air. *From Steam Topics, a publication of Spirax Mfg. Co., Ltd., Cheltenham, Eng.*

Curtain Rod Solves Pesty Problem in English Plant

HERE IS A simple solution to a bothersome problem. To prevent the flexible cord of the electric cutter from getting in the way of the



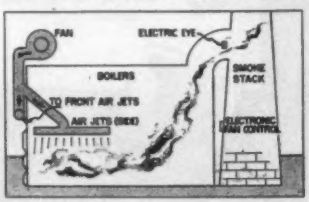
Curtain rod and runners prevent cord from getting in the operator's way

operator, the Webwear Clothing Manufacturers, Durham, England, hung the cord on a curtain rod, with runners suspended from overhead. *From Target, a publication of Central Office of Information, London, England.*

No Smoke Here! It's Done with Electronic Eyes

ELECTRONIC EYES that never sleep are on constant patrol to see that no black smoke gets up the stack at the Brush Division plant of Pittsburgh Plate Glass Co. in Keene, N. H.

The boilers are hand-fired with lumber scraps from the brush handle plant and before the new smoke-



Tinted areas show the new equipment which prevents escape of heavy smoke

abatement equipment was installed there were frequent occasions when black smoke poured out the stack due to improper combustion.

Now, an electric eye located at the entrance to the stack kicks on a big fan as soon as the smoke reaches a

Ruggedly constructed, simply designed units permit easy removal when servicing or replacement is required. Plug-in feature of galvanometer and control units eliminates damage to measuring and control elements . . . provides greater efficiency in making range changes or adjusting control to fit particular requirements.

CHECK THESE
Performance Features:

- √ *Snap-action control relay is highly responsive to changes in thermocouple emf.*
- √ *Separately enclosed high-resistance galvanometer is exceptionally stable and has high sensitivity.*
- √ *Vane-type electronic control provides continuous non-cyclic action.*
- √ *Control sensitivity easily adjusted to meet individual control requirements or abnormal vibration changes.*
- √ *"Fail-safe" design and thermocouple burn-out feature protect work load.*
- √ *Neon light warns of component failure.*
- √ *Plug-in design reduces maintenance, simplifies servicing.*
- √ *Easily installed, low in cost.*

THE sound design, trouble-free performance and flexibility of application of the *Pyr-O-Vane* and *Protect-O-Vane* electronic controllers, invite the most critical inspection or rigid test.

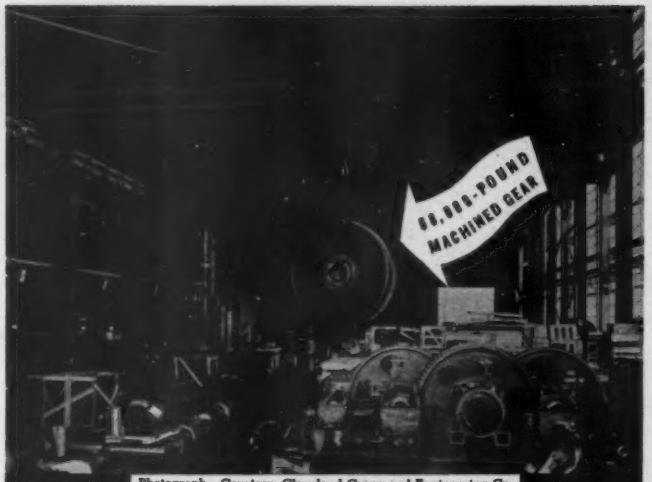
The Pyr-O-Vane is ideal for practically all temperature control applications. It is available with on-off, two or three position control.

The Protect-O-Vane is especially designed to protect electric and fuel-fired furnaces from excess temperatures. It automatically cuts off power and/or the fuel supply when a safe limit is exceeded.

Check the performance features, study them . . . then call your local Honeywell engineer for a discussion of their utilization in your plant. Specification sheets Nos. 112 and 113 sent on request.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
Brown Instruments

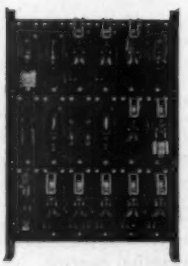


Photograph—Courtesy, Cleveland Crane and Engineering Co.

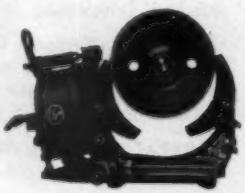
Pin-Point Accuracy IN SPOTTING
—AN EC&M HOIST CONTROL FEATURE

The EC&M Wright Circuit Controller and the EC&M Type WB Brake are an unequalled combination for D.C. crane-hoists. The Wright Circuit puts all the current from the line on the first point lowering through the coil of the quick responding WB Brake. The result is *fast brake release*—accurate spotting of loads with a minimum number of movements of motor, contactors and brake. Maintenance men recognize this as a contributing factor to reduced up-keep.

The operator has complete control of the load at all times in lowering. The Wright Circuit is SAFE! Specify EC&M Control when buying new cranes or revamping existing ones.



The Wright Circuit Controller for crane-hoists.



Type WB Brake for hoist motors.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

certain density. Jets of air are forced into the fire, providing better combustion and reducing smoke almost to zero. *From Pittsburgh People, a publication of Pittsburgh Plate Glass Co., Pittsburgh 22, Pa.*

Water Impact Damages Aircraft Surfaces

AERONAUTICAL DESIGNERS have found that the leading edge of an aluminum wing or fin can be expected to last only about 40 hours if flown at a speed of 400 miles per hour through rain. Within that period of time the impact of the water just about eats through the metal skin. Other exposed parts, such as radar domes, made of plastic, erode even faster. This water problem becomes one of importance since the Air Force is now dealing with speeds higher than the one previously mentioned.

Experimental applications of a coating of neoprene 0.010 to 0.012 in. thick have been found to provide protection for at least ten hours of rain-lashed flight. Such a coating is easy to apply and can be sprayed or painted on the exposed parts when mixed with a solvent. When the coating begins to show signs of wear another coating can be sprayed right on top of the previous coating. *From The Betz Indicator, a publication of W. H. and L. D. Betz, Philadelphia 24, Pa.*

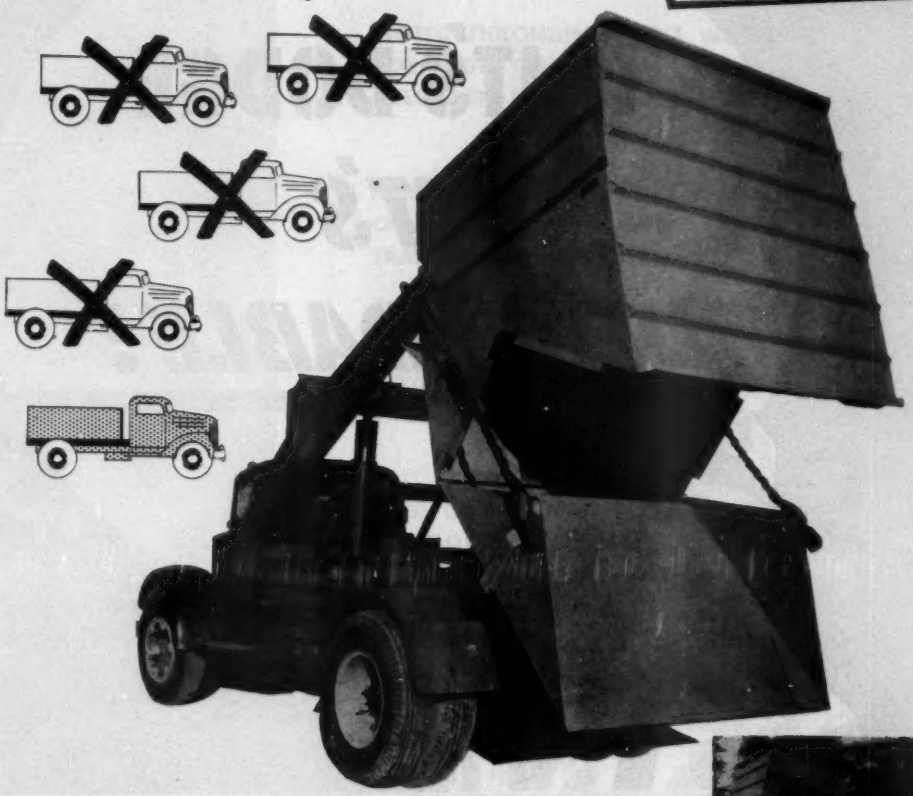
Glass Tube Passageway

The two views are those of a passageway connecting the new Corning Glass Center with the Steuben glass plant. This is one of the first instances where glass tubes have been used in a vertical manner. (From P. P. G. Products, publication of Pittsburgh Plate Glass Co.)

(Continued on page 38)

You Can Do The Work of 3 to 5 Conventional Trucks With Only One ——

DEMPSTER DUMPSTER

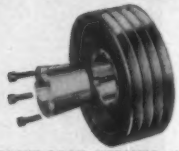


In many plants handling materials by the Dempster-Dumpster System, one truck-mounted Dempster-Dumpster, operated by only one man, the driver, has replaced 3 to 5 conventional trucks and crews. One Dempster-Dumpster services a multiple number of detachable containers in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish. Containers are conveniently located at accumulation points inside and outside buildings. The Type LFW Dempster-Dumpster shown above handles containers up to 12 cu. yds. Containers up to 21 cu. yds. are available with our Type ARLF and DTLF Dempster-Dumpsters. Without question, the Dempster-Dumpster System is the most economical and most efficient method of plant materials handling by truck yet devised! Write today for complete information. Manufactured exclusively by Dempster Brothers, Inc.

DEMPSTER-DUMPSTER, operated by means of hydraulic controls in cab, picks up each container, hauls and empties it or sets load down intact.

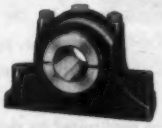
DEMPSTER BROTHERS - 1111 Shea Building - Knoxville 17, Tennessee

IF IT'S DODGE -IT'S DEPENDABLE!

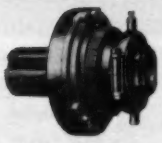


TAPER-LOCK SHEAVES: A Dodge "first." Patented. (Taper-Lock is the world's simplest mechanism for mounting wheels to shafts.) 476 stock sizes in A, B, C and D grooves.

TORQUE-ARM SPEED REDUCERS: America's most complete line of shaft mounted speed reducers. Capacities from 1 to 27 h.p. Output speeds from 12 to 330 r.p.m.



DODGE-TIMKEN BEARINGS: Another Dodge "first." Mounted units, proved in millions of industry's toughest jobs. Four types to choose from. Shaft sizes from 1-3/16" to 8".

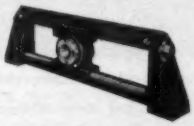


ROLLING GRIP FRICTION CLUTCHES: Another Dodge "first." No toggles. Flexible, smooth. Bolted plate and gear tooth plate. 1.3 to 21.2 h.p. at 100 r.p.m.

SLEEVOIL BEARINGS: Another Dodge "first." Precision-built, quiet, dependable — "tops" for fan and blower service. Sizes 1-7/16" to 8" in both plain and water cooled types.

SOLID STEEL CONVEYOR PULLEYS: Maximum strength, minimum weight. *Modern* pulleys with interchangeable hubs that cut installation cost. Diameters 6" to 8'. All face widths.

DODGE V-BELTS: Concave sidewall design. High-strength cord section. Factory measured to insure matched drives with Dodge precision-built sheaves —for dependable performance.



DODGE TAKE-UPS: Modern, rugged, dependable. Roller bearing (illustrated), ball bearing and babbitted. Shaft sizes from 3/4" to 4". Travel from 4" to 36".

SPECIALISTS IN POWER TRANSMISSION MACHINERY FOR 73 YEARS

●

NOTED THROUGHOUT THE WORLD FOR HIGH QUALITY, PRECISION MANUFACTURE

●

MANUFACTURERS OF A BROAD LINE OF MECHANICAL POWER TRANSMISSION MACHINERY

●

ORIGINATORS OF NEW AND BETTER PRODUCTS FOR THE MECHANICAL TRANSMISSION OF POWER

●

USED CONFIDENTLY WHERE THE GOING IS TOUGHEST

DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER: Most Dodge products are normally available from distributors' stocks — in your territory — when you need them. For information on the newest and best methods of mechanical power transmission, call the Dodge Transmissioneer, graduate of the Dodge factory course. He is your local Dodge Distributor. Look for his name under "Power Transmission Equipment" in your local classified telephone directory.

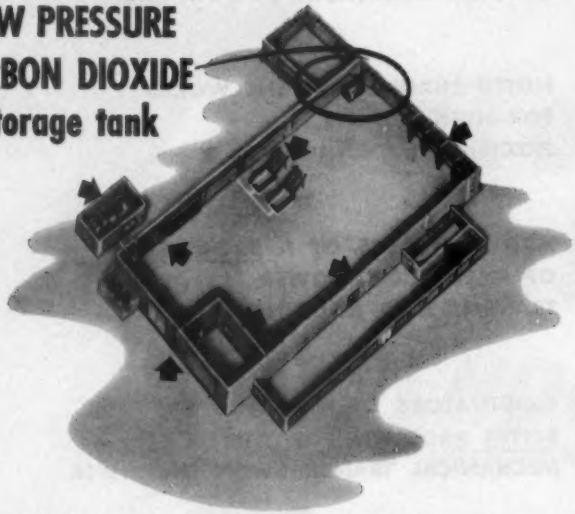
PILLOW BLOCKS: Roller Bearing, Ball Bearing, Babbitted. **FLANGE BEARINGS:** Roller, Ball, Babbitted. **HANGER BEARINGS:** Roller, Ball, Babbitted. **TAKE-UPS:** Roller Bearing, Ball Bearing, Babbitted. **BASE PLATES. FLOOR STANDS. DROP HANGERS. V-BELT SHEAVES:** Both TAPER-LOCK and Bored-to-Shaft-Size. **BELTS:** Industrial and FHP V-Belts and Flex-Link Belting. **SPEED REDUCERS:** TORQUE-ARM Shaft Mounted Speed Reducers. **CLUTCHES, FRICTION:** Rolling Grip, Diamond D and Solid Types. **COUPLINGS:** TAPER-LOCK Flexible, TAPER-LOCK Rigid and Flange Types. **SAFETY SET COLLARS. PULLEYS:** Steel Split Transmission and Solid Steel Conveyor Pulleys. Rubber Lagging. **VISES:** SLIDE-SET Machinist's...FOR COMPLETE LINE, TYPES AND SIZES, WRITE FOR BULLETINS AND 224-PAGE CATALOG.

DODGE

"First in Power Transmission Machinery!"

Plant-Wide Fire Protection

from a single LOW PRESSURE CARBON DIOXIDE storage tank



Now, your larger size fire hazards can be protected more efficiently at less cost, thanks to C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area . . . to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Flexibility is the keynote of these new type C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons . . . discharge facilities can either be manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs. Future plant expansion is easily and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank and adding the supplementary discharge facilities at a later date.

C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems are built with the same superior design and high quality workmanship that have characterized C-O-TWO High Pressure Carbon Dioxide Type Fire Extinguishing Systems for many years. Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

So, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning fully approved fire protection facilities for your various properties. Complete free information and descriptive literature is yours for the asking. Get the facts today!

C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

(Continued from page 34)

Make Safety a Game

THE SAFETY committee of the Colorado Fuel and Iron Corp. has devised a clever matchbook contest. When the employees receive their paychecks, the paymaster also hands them a single matchbook. Printed under the stitch of the safety matchbook is one of the six letters that make up the word, "Safety."

The employee that finally collects six covers whose letters spell out the word safety, wins two tickets to one of the movie houses in town. But more important that the pair of movie tickets, is the series of safety messages printed on the covers of the matchbooks. In this way the employees receive a lesson in safe work practices which are illustrated on the book covers while collecting the matchbooks. *From Blast, a publication of Colorado Fuel and Iron Corp., Pueblo, Colorado.*

When Floor Space is Scarce

Photo: Westinghouse Electric Corp.

Maximum utility of floor space is obtained by use of A-frame racks that hold five motor rotors per square foot of floor. Racks are made from standard rolled steel sections flame cut to proper length and then joined by arc welding

Sound Engineering Prevents Frost Heavage

THE CONVERSION of existing storage space into freezer storage facilities can be a complicated and troublesome experience because of the possibility of frost heavage, especially if the area to be converted is below ground level. The most practical method of guarding against this frost formation is by circulation of air under the floor. Although there are several ways of providing air circulation for converted low-temperature storage in existing buildings, the method chosen by the Welch Grape Juice Co. is both different and efficient.

At their North East, Pa., plant

This FREE MANUAL brings you up-to-date on the use of IMPROVED PLANT LIGHTING to SOLVE defense production problems

32 PAGES OF THE

Latest Lighting Data

AND OVER 50 ILLUSTRATIONS SHOWING

How Leading Factories

are obtaining more production . . . greater precision . . . fewer rejects . . . lower accident rates . . . higher employee morale through the use of the 12 BASIC BENJAMIN LIGHTING SYSTEMS and many other lighting units for special applications

PURPOSE OF THIS GUIDE is to provide you with up-to-the-minute information on the elements involved in securing *better lighting for industrial production*. It is designed to show you how to analyze lighting problems and serve as a guide to their solutions.

THE GUIDE TELLS YOU HOW Benjamin Lighting Specifications can be applied today . . . under today's conditions . . . *to meet today's production problems*, today's need for greater use of floor areas and today's problems of installation.

12 BASIC BENJAMIN LIGHTING SYSTEMS and many specialized lighting units to help solve production problems, are recommended by Benjamin. These Systems are the result of *50 years of specialization* in the lighting of all types of factories, large and small. Included are those engaged in the manufacture of essential goods, such as aircraft, guns, ships, tanks, powder, ammunition, chemicals, clothing, food, etc.

IMPORTANT INFORMATION is also included, concerning recent Benjamin developments which *facilitate maintenance, cut operating costs* and *provide sustained lighting efficiency*. Covered are such advancements as the new "Magna-Flo" Systems which utilize the new Slimline Fluorescent Lamps; "Springlox" Lampholders, which speed up fluorescent lamp maintenance; and "Turnlox" reflector equipment, which promotes simplified maintenance of incandescent units.

THE GUIDE IS WRITTEN for the busy industrial executive, engineer, foreman, architect, and all others concerned with the planning, purchasing and installation of industrial lighting equipment in plants engaged in essential production. For your free copy, sent without obligation, write today to BENJAMIN ELECTRIC MFG. CO., DEPT. PE, DES PLAINES, ILLINOIS.

SCORES OF QUESTIONS LIKE THESE ARE ANSWERED IN THIS FREE GUIDE . . .

How many can you answer NOW?

What Defense Production Problems can be solved with Improved Plant Lighting?
What are the 6 steps in the initiation, development and completion of a successful planned lighting program?
How to analyze present lighting
How to determine how much light and what kind of light is needed
How to select the lighting system best suited for each lighting requirement
How to solve special lighting problems with special lighting units
How to secure specifications and estimates
How to appraise lighting equipment for plant lighting
How to determine which lighting system best answers your needs.

Attach this to your letterhead and mail to:

Benjamin Electric Mfg. Co., Dept. PE
Des Plaines, Illinois

Please send, without obligation, the FREE GUIDE to IMPROVED PLANT LIGHTING, containing up-to-date information on how to solve defense production problems by the application of latest lighting practices.

D-24885

50 BENJAMIN

BENJAMIN *Lighting Equipment*

SOLD EXCLUSIVELY THROUGH ELECTRICAL DISTRIBUTORS

EVERY NEEDED UNIT FOR IMPROVED PLANT LIGHTING

WHEN THE JOB HAS GOT TO BE
RIGHT!

Snap-on*
TORQOMETERS
assure Precision Tensioning

It doesn't take a man one second longer to snug down a nut to exact tightness of factory specifications, with a Snap-on Torqometer. Sturdy, accurate Torqometers can easily pay for themselves by saving *just one critical assembling job* from "going bad" when it gets back in service. Even the most skilled mechanics can't be expected to approximate specified bolt tension "by feel." But with Snap-on Torqometers, the exact tension can be applied with ease. Torqometers are available in 15 models, ranging from zero to 30 inch-pounds, up to 2000 foot-pounds torque capacity. Factory branch offices and warehouses in 41 important industrial centers. Write for special Industrial and big General Catalogs.

SNAP-ON TOOLS CORPORATION
INDUSTRIAL DIVISION
8068-K 28th Avenue, Kenosha, Wis.

*Snap-on is the trademark of Snap-on Tools Corporation

they have a considerable number of freezers built 14 to 18 ft below ground level. Excessive moisture conditions and an underground stream that flowed through the center of the building further complicated matters. Although the stream was confined in a concrete trench, it still contributed to the over-all moisture problem.

The wet condition of the basement walls made it necessary to deal with this problem as well as the floor ventilation. To meet this condition, a new cinder block wall was built about a foot away from the original building wall. This offered protection from moisture flowing through from the wall and also provided a passage for air circulation.

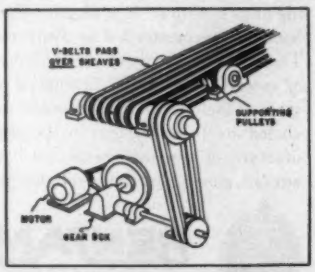
Concrete sills were installed on top of the existing floor for two reasons. Due to the slope of the floor, the sills served as a levelling medium and also introduced an air space under the floor of the freezer.

For increased protection, a means of permitting air circulation in another direction was desired. This was brought about by laying a row of pre-cast, hollow, steel reinforced concrete slabs over the concrete sill construction, the entire length of the freezer rooms. This unique means of ventilation permits two-way natural circulation of air at all times under the freezer floors.

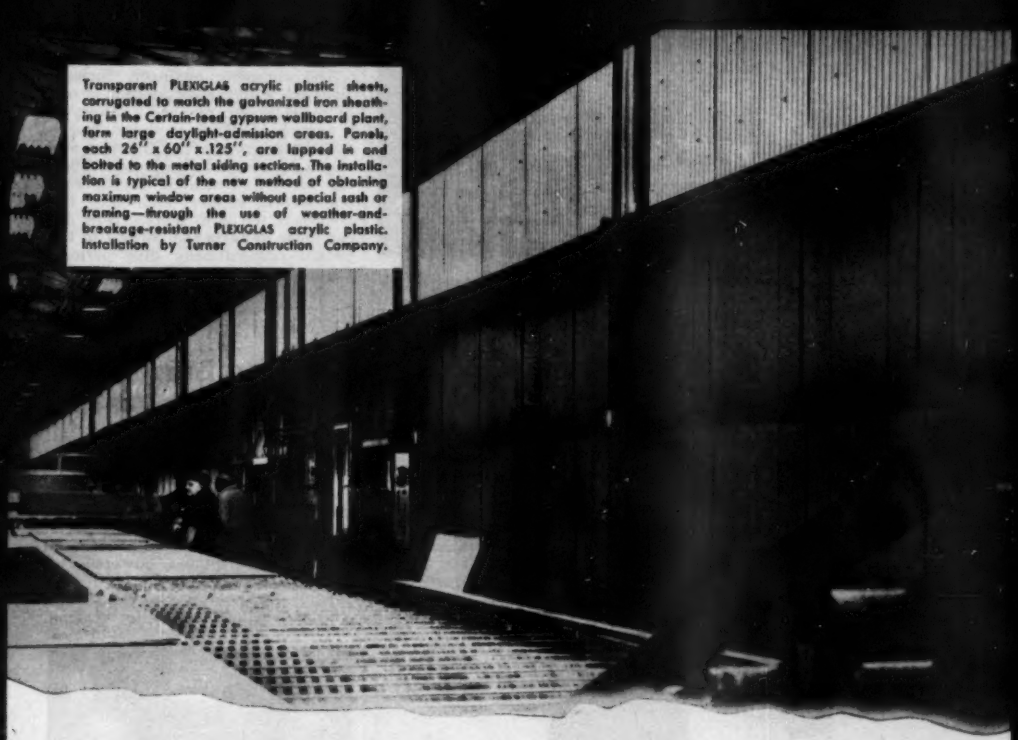
Once the ventilation problem was overcome, the rest of the job was comparatively easy to install. Two layers of 3 in. corkboard were applied to the walls, floor and ceiling. A concrete wearing floor was installed over the floor insulation. The finish for the interior walls and free standing partitions was portland cement. *From Armstrong's Insulator, a publication of Armstrong Cork Co., Lancaster, Pa.*

Lard Gets a Belt Ride

At the DuQuoin Packing Co., DuQuoin, Illinois, lard was packaged on a work table equipped with a trough to guide the cartons. The operator had to push the filled cartons down the table to the packer for closing and sealing. Occasionally a carton was upset with a consequent loss of time for clean-up. Furthermore the operator had to stop



Belting and drive arrangement for lard movement from operator to the packer



Transparent PLEXIGLAS acrylic plastic sheets, corrugated to match the galvanized iron sheathing in the Certain-teed gypsum wallboard plant, form large daylight-admission areas. Panels, each 26" x 60" x .125", are lapped in and bolted to the metal siding sections. The installation is typical of the new method of obtaining maximum window areas without special sash or framing—through the use of weather-and-breakage-resistant PLEXIGLAS acrylic plastic. Installation by Turner Construction Company.

Good Idea in Industrial Glazing...

Sashless, Frameless PLEXIGLAS Windows

PLEXIGLAS acrylic plastic windows stretch for hundreds of feet in Certain-teed Products' Fort Dodge (Iowa) plant. Yet there's not a sash or frame in the whole installation! The corrugated PLEXIGLAS panels are *part of the wall*—simply lapped in and fastened to the metal siding.

Light weight, strength and resilience make this money-saving method possible. PLEXIGLAS weighs less than half as much as glass, yet withstands hard blows and heavy stresses. You get extra benefits, too—full, even daylighting through light-diffusing white translucent PLEXIGLAS—fast, easy installation—safety and low-cost maintenance.

Clear transparent and white translucent PLEXIGLAS have *many* glazing applications—in skylights, doors, partitions and conventional windows. Users find it especially valuable in high-breakage areas or those difficult to daylight. We'll be glad to send you full particulars upon request.

PLEXIGLAS is a *trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.*

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queens Quay at Jarvis Street, Toronto, Ontario, Canada

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

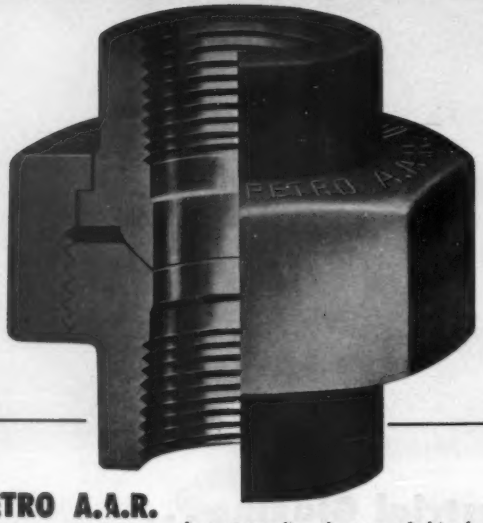
Representatives in principal foreign countries

Your Most Useful Servants

PETRO

REG. U.S. PAT. OFF

FORGED STEEL UNIONS



PETRO A.A.R.

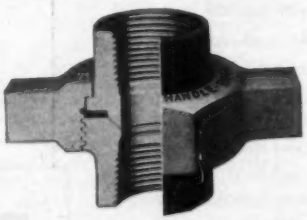
REG. U. S. PAT. OFF.

An outstanding feature of this desirable Union is its Permanently Lubricated Nut Threads, which permit making and breaking with ease, thus eliminating wrench abuse. Other important features include hot forged from A.I.S.I. 1023 killed steel. Integral steel to steel seats (ball to 45 cone) with the female seat being cold rolled to maintain a differential of 40 points Brinell hardness between the seats. Pressure ratings to 3000 lbs. and temperatures to 1000.

HANDLE-BAR 4000 TEST

REG. U. S. PAT. OFF.

HANDLE-BAR Unions are precision built with features that insure trouble-free performance. Hot forged from A. I. S. I. 1023 killed steel. Modified Acme threads in the nut. Nut threads permanently lubricated with Udylited Cadmium to permit ease in making and breaking. Steel to steel or bronze to bronze seals. Furnished Black or all Rust-proofed. Pressures to 3000 lbs.



Write Dept. N for illustrated catalog or refer to listings in Composite Catalog pages 3140-3141, Refinery Catalog page 538, and Chemical Engineering Catalog pages 980-981.

ORDER BY TRADE NAME FROM YOUR LOCAL SUPPLY STORE

PIONEERS OF STEEL UNIONS SINCE 1912

CLAYTON MARK & COMPANY

1900 DEMPSTER STREET • EVANSTON, ILLINOIS

filling the empty cartons each time he had to move the cartons already full of lard.

The company engineer, Richard Ragland, with the cooperation of one of our engineers planned a conveyor, a portion of which is shown in the accompanying sketch. The two end shafts are movable for tension while the three intermediate shafts, only one shown, support and carry the weight of the lard cartons. Now the conveyor delivers the cartons to the packer automatically thus permitting the operator to fill more cartons than before. *From Gates Industrial News, a publication of Gates Rubber Co., Denver Colo.*

Job of Cutting Shanks From Blind Rivets Is Made Easy

SOLVED: The tedious, hand-blistering chore of cutting protruding shanks from blind rivets.

After the rivets were in place, there remained the job of clipping the 680 tough protruding shanks, a task which required a full hour and left the worker's hands blistered and swollen.

Andy Moeller tried to figure out a way in which this could be done easier. After considerable thought, he came up with a rivet squeezer equipped with cutting jaws and a compressed air jet for freeing the tool of cuttings.

Worker demonstrates the device which is used for clipping blind rivet shanks

With the aid of this device a worker can now clip the 680 rivet shanks on a horizontal stabilizer in about 20 minutes, easily and comfortably. *From the Lockheed Star, a publication of The Lockheed Aircraft Corporation, Burbank, Calif.*

Higher Performance With Lower Viscosity

HIGH SPEED machines are gaining prominence in industry. These bring with them an inherent condition of greater frictional losses which can be reduced by a planned use of lower viscosity oils.

(Continued on page 48)

Prove for yourself why Gates Vulco Ropes are giving you longer V-Belt Wear!

This big bandmill, in the Masonite Corp. plant at Ukiah, Calif., is driven by Gates Vulco Ropes. The saw has a capacity of 200 thousand board feet of lumber in 8 hours.

There is a very simple reason why Gates Vulco Ropes—the V-belts built with *concave sides*—are giving you substantially *longer wear*—and you can easily prove this for yourself in just 2 minutes' time!

Pick up *any* V-belt whatever and bend it as it bends when going around a pulley. As the V-belt bends, grip its sides with your fingers—and here is what will happen, every time.

If the belt you are bending is a *straight-sided* V-belt, you can *feel* its sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-pulley—as shown in figure 1-A (see accompanying diagrams).

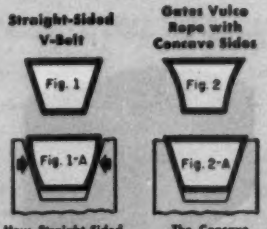
Clearly, this *uneven pressure* against the V-pulley causes the belt to wear *unevenly*—with the wear *concentrated* where the bulge is greatest—and this concentrated wear at one point naturally shortens the life of a *straight-sided* V-belt.

Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt *costs* for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5110

Gates

Hose · V-Belts · Molded Rubber Goods for Industry

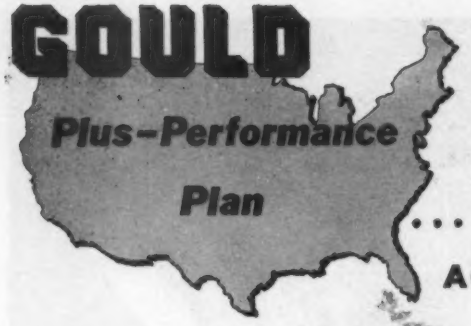
VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U.S.A.

World's Largest Maker of V-Belts

GOULD



...SHOWS YOU HOW ACCURATE RECORDS

LENGTHEN BATTERY SERVICE!

Keeping of accurate records is vital to the conservation and extension of essential battery power. The GOULD PLUS-PERFORMANCE PLAN makes the keeping of battery records easy by providing you with full information on how to test your batteries, and charts and forms for recording test data.

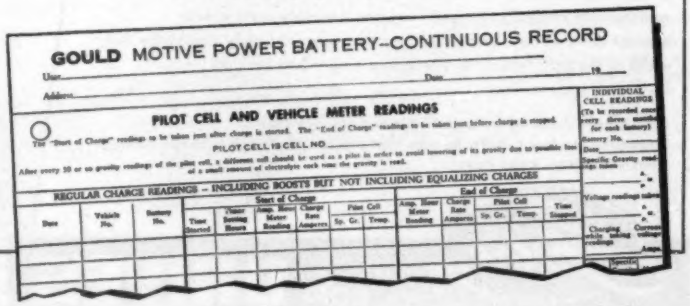
This timely plan puts at your disposal a complete system of manuals, articles, specifications, bulletins, charts, graphs and forms explaining and illustrating how to select, charge and handle, maintain and determine the condition of your batteries. This material, which can increase battery service as much as 50%, is FREE to battery users, without obligation. A request on your letterhead will bring descriptive booklet by return mail.

DAILY RECORD SYSTEM CONTROLS BATTERY MAINTENANCE

Number each battery and, as each is installed, read and record its specific gravity and temperature on chart illustrated below (these charts are FREE on request to users of the GOULD PLUS-PERFORMANCE PLAN). Record also, date each battery is put into service, and vehicle to which each is assigned. When each battery is charged, specific gravity, temperature, time, setting of ampere-hour meter and the date and amount of water are recorded.

Such a record tells 1) whether batteries are fully charged when placed in service; 2) number of hours each battery was in service; 3) if batteries were discharged below normal value; 4) whether batteries are being properly charged; 5) when batteries should be changed to prevent overworking and resultant failure during shift.

The GOULD "Thirty" with "Z" PLATES—
America's Finest Industrial Truck Battery



GOULD MOTIVE POWER BATTERY–CONTINUOUS RECORD

User_____ Date_____ 19____

Address_____

PILOT CELL AND VEHICLE METER READINGS

The "Start of Charge" readings to be taken just after charge is started. The "End of Charge" readings to be taken just before charge is stopped.

PILOT CELL IS CELL NO. _____

After every 50 or so gravity readings of the pilot cell, a different cell should be used as a pilot in order to avoid lowering of its gravity due to possible loss of a small amount of electrolyte each time the gravity is read.

INDIVIDUAL CELL READINGS (To be recorded once every three months for each battery)

Battery No. _____

Date _____

Specific Gravity readings taken

Voltage readings taken

Charging Vehicle Meter readings

Current Voltage

Amps.

Specific Gravity

REGULAR CHARGE READINGS – INCLUDING BOOSTS BUT NOT INCLUDING EQUALIZING CHARGES

Date	Vehicle No.	Battery No.	Start of Charge: Time Started	Water Running Hours	Amp. Hour Meter Reading	Charge Rate Amperes	Pilot Cell: Sp. Gr.	Pilot Cell: Temp.	End of Charge: Amp. Hour Meter Reading	Charge Rate Amperes	Pilot Cell: Sp. Gr.	Pilot Cell: Temp.	Time Stopped

GOULD STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

BULLETINS just released and of immediate plant interest

INSTRUMENTS AND CONTROLS

101 Pressure Switches — To promote a better understanding of the complex problems involved in the proper application of pressure switches 32-pp Catalog 1MB-1 includes a glossary of terms, tabulation of available units based on function and pressure or vacuum range, diagrams for circuit detailing, an electrical rating table, other application data. Presents a comprehensive coverage of operating characteristics for diaphragm, bourdon tube, and piston type pressure actuated switches from extreme vacuum to extreme pressure. Barksdale Valves.

102 Heating - Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog F-1753-3. Compiled to aid plant engineers in the selection of control equipment to meet rigid specifications, book is well illustrated and provides application and installation data, dimensions, ratings. Includes an explanation of terminology and general engineering information on the use of control equipment. Barber-Colman Co.

103 Measuring System Variables — Instrumentation Data Sheet 9.1-10 describes General Electric telemetering systems and their use with Brown Electronik recorders in providing ample measurement of system variables plus wire speed transmission of intelligence to central locations. Describes telemetering requirements, fields of application, basic equipment, and operation of both frequency and balance type G. E. telemeters. Typical telemetering combinations used in electrical power systems are diagrammed. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

104 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters are also covered. An added feature is found in the excellent engineering tables. United States Gauge Div., American Machine and Metals, Inc.

105 Electronic Control System—Bulletin A-701 introduces company's Autronic system, a miniature all-electronic system for controlling pressure, temperature, flow and level. It is intended for use in chemical processing plants, refineries, central stations, other applications where fast, accurate control is required. Illustrated with photos, dimensional drawings and a schematic diagram showing operation principle, describes control unit, recorder unit, optional manual control unit, and air pilot. The Swartwout Co.

106 Recording Oscillograph — CEC Bulletin 1500B describes a multi-channel, precision instrument for analysis and measurement of strain, vibration, pressure, acceleration and other phenomena. Discusses evaluation by dynamic testing, explains the oscillograph in detail, illustrating its optical system and listing standard equipment. Also describes galvanometers, accessories. Consolidated Engineering Corp.

ELECTRICAL

108 Explosion-Proof Motors — Eight pp Form 1629, illustrated in full color, explains why company's explosion-proof and totally enclosed motors provide safe power and give long service, presents types for both hazardous and non-hazardous locations. A large cutaway illustration shows construction details and there's a detailed discussion of the Lubrifuah principle of bearing lubrication incorporated in the motors and absestos protection given motor windings. U. S. Electrical Motors, Inc.

109 Synchronous Motors—Standard construction features of manufacturer's low speed, coupled-type pedestal-bearing synchronous motors are described in Bulletin 05B7648. Features discussed are available in these motors in ratings aproximately 100 hp and larger at speeds of 450 rpm or less. The motors are applicable for direct-coupled drives with widely varying torque requirements—as in rock grinding mills, Banbury mixers, and low head centrifugal, axial flow and screw type pumps, etc. Allis-Chalmers Mfg. Co.

110 A-C Motor Selection Tips—"How to Select Alternating Current Motors for Application to Air Conditioning, Heating, Ventilating and Refrigeration Equipment," is an 8-pp article outlining and illustrating basic types of a-c motors. Describes their starting and running characteristics, tells where and why each type is best suited for particular applications. Wagner Electric Corp.

111 Vertical Induction Motors—Data on ratings, construction and types of large vertical induction motors are contained in Bulletin 05B7629. Widely used for pumps and other vertical drives, vertical solid shaft induction motors described are available in ratings upwards from 60 hp at 200 rpm. Except for bearing arrangement, mechanical construction of the motors is similar to that of horisontal units. Allis-Chalmers Mfg. Co.

112 Induction Frequency Converters — Publication GEA-5637 covers three-phase equipment in ratings from ¾ to 100 kw. Describes the fundamentals, operation and construction features of the high frequency power supply apparatus, and includes application information, modifications, and limitations and complete tables of ratings and frame sizes. General Electric Co.

113 Totally-Enclosed Motors — Advantages and limitations of manufacturer's totally-enclosed motors with air-to-water heat exchangers are related in Bulletin 05B7682. Properly fitted enclosures keep out dust, dirt, fumes and excess moisture, bulletin states, and maintenance is reduced and machine life lengthened. Describes three types of cooler arrangement—foundation, side or top mounting—built into the motors and explains how to estimate water requirements. Allis-Chalmers Mfg. Co.

114 Power Conversion Units — Publication GEA-5658, on metallic rectifier power-conversion units, describes the features of this equipment, its application and operation. Illustrated with photos, line drawings and charts showing efficiency and regulation curves for various sized units, includes specification guide for d-c power supplies and exciters, also complete rating charts and dimensions. General Electric Co.

115 Plugs, Receptacles—This bulletin on company's circuit breaking series of plugs and receptacles describes in detail and illustrates the safety and durability construction features of these heavy duty connectors for portable electrical equipment from 20 to 200 amp ratings. Sizes and styles tabulated, circuit diagrams included. The Pyle-National Co.

116 When Batteries are "Sulfated" — Now available are data sheets on how to return to full service motive power storage batteries which have lost capacity due to "sulfation"—formation of lead sulfate on positive and negative plates due to continued undercharging while in use, or prolonged idleness without charge. Sheets give six causes of sulfation and 11 steps to follow to restore batteries from early stages of sulfation to point where battery must be scraped. Gould-National Batteries, Inc.

117 Pressure Connectors—Bulletin 60, a 56-pp ordering catalog, lists and illustrates company's three complete lines of pressure fittings: the Lock-Tite, featuring a wide range of cable sizes; the Tite-Bind, which is precision engineered; and the precision Hinjon line which works on the nutcracker principle. Listings cover connectors, lugs and taps for all kinds of copper conductors. Picture table of contents is provided and full-page drawings show operation of each type. Dimensional diagrams accompany each listing. A special section is devoted to fittings approved by the Navy, and another to bus bar fittings. Wire tables and charts included. The Thomas & Betts Co., Inc.

118 Electronic Tubes — Here's a 28-pp catalog furnishing complete technical specifications and other information on tubes for control, processing, production, research, testing, counting, sorting, weighing, measuring, detecting and many other applications. Features nationally-known brands. Milo Radio and Electronics Corp.

CONSTRUCTION AND MAINTENANCE

119 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, special features of company's roofing materials. Explanations are brief, suggestions practical. Johns-Manville.

120 Open-Steel Floors—"Versatile Open-Steel Flooring," is a 16-pp idea book pro-

November, 1951

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Please Print or Typewrite

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City ..... State .....

(If you prefer delivery at your home also fill below)

Home Address .....

City ..... State .....

.....

.....

.....

Also, use this card for more information on advertised products.

fusely illustrated with installation photos showing many and varied possibilities for using steel grating inside industrial plants, power plants, in refineries, for outdoor catwalks and stairways, etc. Explains types and features of this flooring and specifications for insuring quality flooring and its proper installation. Open Steel Flooring Institute, Inc.

121 Overhead Doors — Sixteen-pp Catalog F1408-11 presents company's Overdoors for use in both new construction and remodeling, for manual or electric operation. Illustrates and describes ease of operation and special construction features of the doors. Gives specifications and provides engineering data for installation of both standard and special models. Also discusses electric operators and electronic control equipment. Barber-Colman Co.

122 Improved Coating—Form B-13 gives detailed application data and lists outstanding uses of company's Laykold Fibrecoat. Written in conversational style, folder outlines utilization of this weatherproof mineral-armored asphalt for protecting bituminous roofs and metal surfaces. Includes specifications, approximate costs. American Bitumuls & Asphalt Co.

PUMPS, COMPRESSORS

123 Self-Priming Motor Pumps — Form 7240 describes and illustrates automatic operation and construction features of a new line of pumps, intended for pumping applications under suction lift where presence of air or vapor in liquid makes it impractical to use conventional-type centrifugal pumps. Includes selection chart, dimensional data on these pumps, available in ¼ to 25 hp sizes. Ingersoll-Rand Co.

124 Centrifugal Pumps—Twenty-pp Bulletin CT50 presents pump specification and cost information in table form; includes a selection table for both belt driven and direct connected centrifugals. A clear cross section with notations shows engineering features of the manufacturer's line. Includes engineering and pump data along with formulas and conversion tables. The F. E. Myers & Bro. Co.

125 Rotary Compressors — Bulletin C-6 offers up-to-date information on manufacturer's rotary compressors and vacuum pumps. Describes and illustrates intake regulator, also end bearing and ring assemblies; explains operating principle. Includes photos of installations. Fuller Co.

126 Air Compressors — Twelve-pp Form 300 presents an illustrated study of company's 25 air-cooled compressors for industrial use. Generously illustrated, includes specifications, explains special construction features of the line. Quincy Compressor Co.

MATERIALS HANDLING

127 Basic MH Facts—Efficient handling of raw and finished materials, their proper storage, and how modern handling machines can help cut costs and save time are covered in this 24-pp pocket-size booklet. Discusses combining small units into big ones, utilization of overhead space for storage, use of trailer trains, and coping with limited manpower force. Also discusses new materials handling equipment. Tells how to figure costs of its use, to figure amortization of machine investment, fixed charges, variable charges that change from job. Industrial Truck Div., Clark Equipment Co.

128 All-Purpose Conveyor—In describing company's Adjustoveyor, this illustrated bulletin shows how basic unit can assume 10 useable positions all suited to different applications. Explains how mobility of unit permits use anywhere around plant for all types of package handling and for use with anything that can be placed on a moving belt. Gives dimensions; stresses economy and flexibility of the unit. Stewart-Glapat Corp.

129 MH Economy Primer—"The How Book of Cost Cutting Materials Handling," 24-pp, is a newly revised edition of company's popular booklet published in 1947. Much of the "How Book" concerns basic background materials covering types of skids, pallets and other industrial handling tools. Also presented is a comprehensive plan for evaluating present handling methods through an engineering analysis similar to a time and motion study. Contains charts for a materials handling analysis. The Yale & Towne Mfg. Co.

130 Power Trucks—This 12-pp brochure includes sections covering high lift and low lift platform trucks, fork trucks and mobile cranes. Lists capacities and dimensional specifications on each class of truck and describes major construction features. Several materials handling ideas are pictured. The Elwell-Parker Electric Co.

131 Improved Fork Truck — Eight-pp Bulletin 1327 shows important construction and operating features of company's new Type PS 2000-lb. fork truck. Photos are used to "strip down" the truck by major components, and complete details accompany pictures. Dimensions and specification sheets contain full engineering information. Other photos show how truck drives like the family car, how blind driving has been eliminated and maintenance simplified. Baker Industrial Truck Div., Baker-Raulang Co.

132 Four Out of Five MH Jobs—This 8-pp illustrated bulletin shows how three models (pallet, skid and platform) of company's Truck-man industrial truck can handle four out of five materials handling jobs. Gives application information and specifications on each modal, provides photos of it in action. Special construction features of the line are described. Truckman Div., The Knickerbocker Co.

133 Trucks, Transmissions — Profusely illustrated, this little 32-pp booklet, Form 3150, briefly describes manufacturer's products, including axles and transmissions for trucks, company's one-piece forged axle housing, combination axle-transmission drive units. Also described and pictured are industrial towing tractors, fork-lift trucks and attachments, powered hand trucks and stackers. Clark Equipment Co.

134 Three-Job Unit — This bulletin on company's portable conveyor-loader-stacker features an easy-to-use dimensional chart showing loading and unloading heights and other major dimensions. Also includes specifications, data on optional equipment. The E. W. Buschman Co., Inc.

135 How to Handle Motor Graders—The "Motor Grader Operator's Handbook," 12-pp, is presented in four-color cartoon style and the operating tips provided are voiced by an experienced operator who serves as instructor. Covers adjustments and techniques that apply to jobs ranging from high bank cuts to flat bottom ditching. Caterpillar Tractor Co.

136 Magnet Selection Guide—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as a handy guide to the selection of magnets from the application standpoint. Tells which magnets to use to remove iron from wet or dry materials carried on conveyor belts, as well as from chutes, ducts. Units for magnetic concentration and purifications, heavy media recovery and materials handling are also discussed. Dings Magnetic Separator Co.

LIGHTING

138 Precision Lamps—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

139 Outdoor Protective Lighting—Complete plans for outdoor industrial lighting are provided in 24-pp Booklet B-4791. Stressing that protective lighting's good protective lighting, booklet sets forth four principles: discourage attempts at entry, make detection certain, aid guard and hinder intruder, and provide reliability. Application suggestions and techniques are given concerning isolated fence boundaries, building face boundaries, industrial thoroughfares. Various power distribution and control systems and mounting methods are provided. Westinghouse Electric Corp.

METALS

140 Alloy Study — Technical Bulletin T-32, 21-pp, combines graphs, tables, photos and text material to present a highly informative booklet on engineering properties of Duranickel. Some of the topics given consideration are: working characteristics, thermal treatment, corrosion resistance, and applications. A brief comparison between Permanickel and Duranickel is included. For additional information about the company's products a list of available bulletins is offered. The International Nickel Co., Inc.

141 Thin Electrical Steels—**How test data** and information are presented in this 36-pp booklet to permit selection of thin electrical steels for high frequency equipment without theoretical determinations, extrapolation of meager data or use of empirical formulas. Representative test results are shown in 21 pp of curves giving magnetic properties of three iron-silicon alloys—a non-oriented grade, an oriented alloy, and a super oriented grade. Curves show core loss, exciting rms volt-amperes per pound, a-c permeability, induction versus frequency, figure of merit and lamination factor. Armco Steel Corp.

142 Plastic Mold Steel Guide—Practical tips on the selection, application and heat treatment of steels for plastic molding are given in "Tooling Up for Plastics," 40-pp. Offers solutions to problems involved in plastic tooling and selection information on choosing a steel for better results and lowers costs. Covers choice of steel for large

(Continued on page 111)

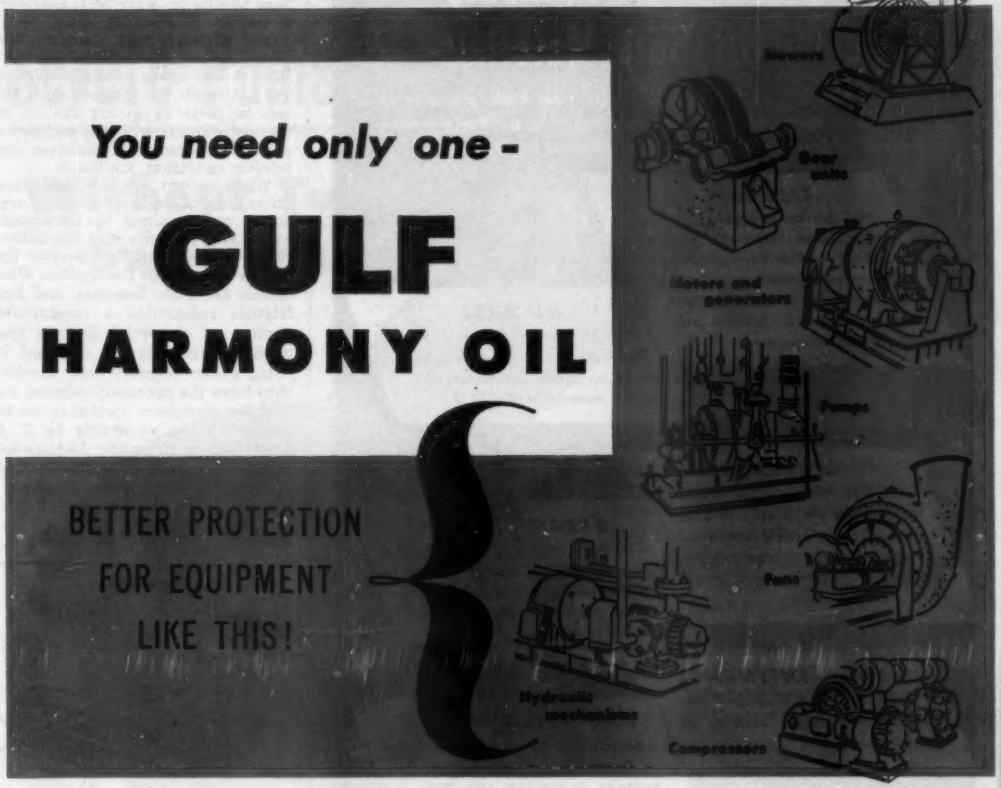
Sec. 34.9, P. L. & R.
FIRST CLASS
CHICAGO, ILL.
PERMIT No. 353

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

WHY handle 3 or 4 lubricating oils for auxiliary plant equipment?



Gulf Harmony Oil is equally effective for sleeve-type bearings, oil-lubricated antifriction bearings, hydraulic mechanisms, compressor cylinders, and many types of gears. That's one important reason it's the ideal oil for auxiliary plant equipment.

Then Gulf Harmony Oil has outstanding resistance to oxidation and the formation of sludge. In force-feed circulating systems, oil reservoirs, hydraulic systems, and antifriction bearings, Gulf Harmony Oil helps prevent harmful deposits, insures against premature oil changes.

Gulf Harmony Oil also provides a protective film which has preferential wetting characteristics for metal —it displaces moisture, interrupts its corrosive action. Thus Gulf Harmony Oil prevents rust on all oil-bathed surfaces—particularly important in precision hydraulic mechanisms and in antifriction bearings operating under damp conditions. And it separates readily from water, reducing the possibility of emulsification, and prolonging its useful life.

Its high lubricating value means more effective protection against wear under boundary conditions. Available in a wide range of viscosities.

Write today for complete information on Gulf Harmony Oil. Also ask for a copy of the booklet "Gulf Periodic Consultation Service," which tells about Gulf's advanced cooperative service for users of petroleum products. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

Check These Advantages of

DRACCO Pneumatic Conveyors

for low-cost handling

of YOUR Bulk Materials

When selecting equipment to handle your bulk granular or powdered materials, your logical choice is a "Performance Proved" Pneumatic Conveyor, engineered by Dracco.

LESS LABOR

The automatic, continuous action of a Dracco Pneumatic Conveyor permits sizeable reductions in manpower requirements. In unloading a hopper bottom car for example, one man need be present only 25% of unloading time.

NO DUST

Completely enclosed Dracco Pneumatic Conveyors mean a clean plant, no product contamination, and no material losses.

SPACE-SAVING

A Dracco Pneumatic Conveyor requiring only the space of a 6 inch pipe, releases valuable plant areas for productive use. Vertical heights, horizontal distance, walls, and floors are no obstacles.

GREATER SAFETY

The high operator safety factor possible with a Dracco system is a well-recognized advantage. Safety plus a clean plant provide increased production.

LOW MAINTENANCE

Simplicity and few moving parts reduce maintenance costs to an absolute minimum.

LOWER MATERIAL COST

Another cost-saving feature is that a Dracco system permits buying materials in low-cost bulk form.

Dracco Pneumatic Conveyors are "Performance Proved". High operational efficiency of each installation is assured by exact engineering to individual requirements. If your materials handling problem involves the movement of bulk chemicals, grains, or other granular or powdered materials, you can profit from the advantages provided by Dracco Pneumatic Conveyors.

DRACCO CORPORATION

4070 E. 116th St., Cleveland 5, Ohio

415 Lexington Avenue, New York 17, N.Y.

DRACCO

Performance Proved

PNEUMATIC CONVEYORS

(Continued from page 42)

Bearings and sliding surfaces, in a majority of cases, operate against a combination of fluid and boundary friction. In a case where fluid friction prevails, the use of progressively lower viscosity oil will tend to partially replace the fluid friction with boundary friction. This condition results in wear and, therefore, a margin of viscosity must be allowed to insure that boundary friction does not occur. The problem is how to use lower viscosity oils and yet not reach the danger point. This can be done by giving the oil increased oiliness with the addition of a small percentage of additives containing oxidation inhibitors.

When speeds are low, and pressures high, there is not much, if anything, to be gained by introducing lower viscosity oils; it is the oiliness of the oil and not its viscosity that chiefly determines the friction. When speeds are high, however, and fluid friction constitutes a considerable portion of the total friction then good results may be obtained by using lower viscosity oils, provided they have the necessary oiliness, and that the boundary friction is not increased. *From an article by T. C. Thomsen, in Scientific Lubrication, published by Scientific Publications, Wellington, Shropshire, England.*

Warning — Gremlin at Work

"Gassy" cuts off the flame during the operation of gas, fuel oil or pulverized coal burners, especially during lighting-up procedure. He is particularly clever in influencing operators of ovens, dryers, heaters, furnaces and boilers to perform their duties carelessly.

REMEDY

Provide approved combustion safeguards for oil burners using liquid, gaseous or pulverized fuels, i.e., devices which will instantaneously arrest all fuel discharge in the event that the flame, ventilation or power should fail or that the burner flame should become dangerously unstable.

"Gassy" is one of the prankish gremlins who like to create havoc in industry. The F. I. A. warns of his unsatisfied desire to do works of mischief and explains how to squelch his activities. (From Sentinel, a publication of the Factory Insurance Association, Hartford 2, Conn.)

Constructed to Take Severe Punishment

Without Tube Swelling

Tube Securely Locked by Special Stainless Steel Inner Wire Braid!

Illustration above shows how exclusive inner stainless steel braid of CONCORD #20 Steam Hose prevents tube swelling and assures long life under severe use.

CONCORD #20 STEAM HOSE

Here's the steam hose with a structural difference that eliminates . . . once and for all . . . the common failure of tube swelling under continuous high pressure operation.

CONCORD #20 Steam Hose gives you the exclusive protection of a tough inner lining . . . a lining of stainless steel wire braid. This braid assures permanent retention of the original inside hose diameter. It prevents swelling and constriction of the tube . . . assures full flow of steam at all times . . . permits re-coupling in the field when necessary, without the slightest difficulty.

In addition, CONCORD #20 construction features include: two or three braids (depending on size) of alternate high tensile steel wire and rubber layers are firmly bonded over the outside of the tube. They provide maximum burst-protection and safety. An asbestos braid provides positive cover adhesion and serves as cover insulator. On top of all is the rugged, abrasion-resistant cover that withstands the severest abuse.

Flexible, tough and dependable . . . that's BWH's new CONCORD #20! Ask your nearby BWH distributor for a demonstration. Get in touch with him today, or write us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

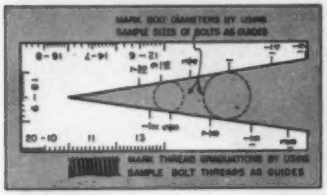
PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

BWH DEPENDABLE RUGGEDNESS

MAINTENANCE & OPERATION

of buildings, utilities and facilities

Bolt Size Gauge


MARK BOLT DIAMETERS BY USING SAMPLE SIZES OF BOLTS AS GUIDES
MARK THREAD GRADUATIONS BY USING SAMPLE BOLT THREADS AS GUIDES

For checking the sizes and number of threads per inch of standard coarse and fine thread bolts in sizes from 7/16 in. to 1½ in. diameter, the simple sheet iron gauge shown will prove very handy

Roller Tracks in Elevator Speed Freight Handling

ROLLER-TRACK sections installed at each of seven elevator landings in one of the buildings of Stewart-Warner Corp., Chicago, permit a moderate-capacity freight elevator recently installed by the Otis Elevator Co. to move over 200 tons of palletized parts between floors daily.

This truck-conveyor-elevator material handling system allows the fork-truck operator to pick up a pallet load of materials, parts or finished goods, carry it to the elevator landing, set it down on the track outside the elevator, signal the elevator and then go for another load.

When the elevator stops at the floor, the attendant pulls the waiting pallet onto a roller conveyor in the elevator, carries it down to the first floor, and pushes it off the elevator and onto a roller track on the landing outside the elevator.

The roller track sections, laid right up to the sill of the elevator hoistway landing, permit one man both to run the elevator and to move loaded pallets on and off.

The elevator is in almost constant motion during each eight-hour shift because it seldom has to wait long at a floor to be loaded or unloaded. Three roller track sections installed on the platform of the car permit the elevator to carry two pallet loads at a time. Track sections on the first floor are long enough for five and eight pallets, while those on each upper floor can hold three.

Roller-track sections installed on elevator platforms and at each of the elevator landings help speed handling of palletized parts between the floors

Special Truck Attachment Reduces Handling Time

Photo: Mercury Manufacturing Co.

By equipping a fork truck with a special ram-type suspension arm, the Whitehead Metal Products Co., has reduced the keg handling time by more than 75 per cent at its Philadelphia plant. The attachment permits multiple stacking of kegs and in addition it enables the company to utilize more fully its in-plant "air rights"

Check Outdoor Insulation Before Winter Sets In

IN PREPARATION for approaching winter, check to see that all heated lines that are exposed to the weather are properly insulated and finished, advises The Magnesia Insulation Manufacturers Association. Otherwise winds, rain, and snow can cause outdoor lines to lose many times the amount of heat that would be lost by indoor piping. In addition to higher fuel costs, excessive heat losses in the case of hot water and condensate lines may result in freezing.

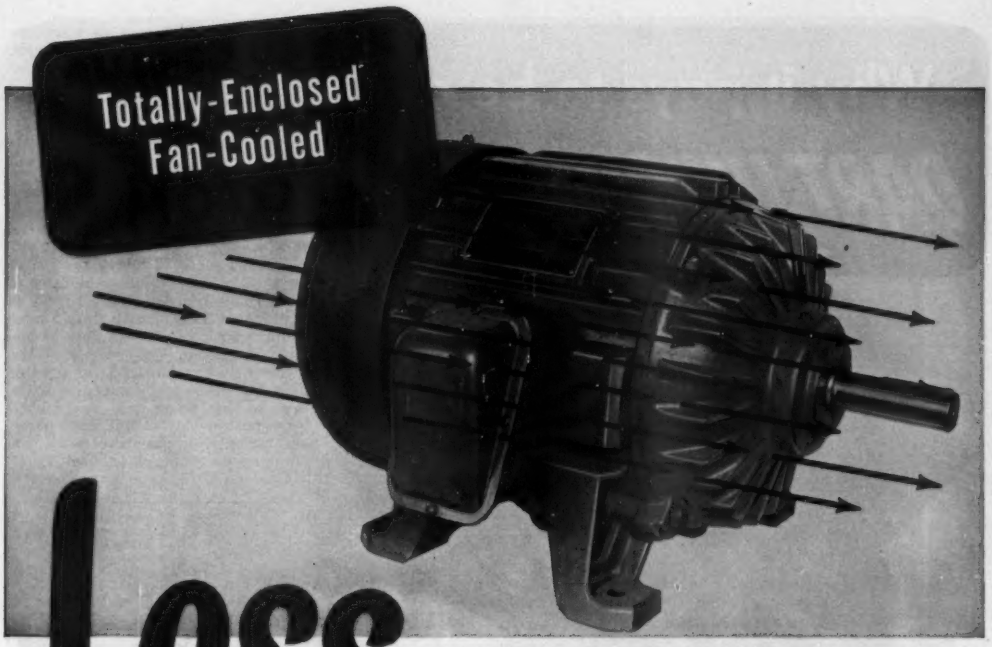
The following points should be noted in making insulation survey to prepare plant for fall and winter:

1. During the earlier part of the year the hot water system may have been extended to an adjoining building, or new steam or condensate lines may have been run outdoors. Check to make sure that all sections of new piping have been insulated.

2. Outdoor lines should be insulated with ½ in. thicker insulation than would be used for indoor lines operating at the same temperature. This rule should also be followed for lines in open areas such as ramps, loading platforms, sidings, and yards.

3. Insulation on outdoor lines should be finished with asphalt saturated asbestos roofing felt. Insulation on flanges, fittings and valves should be finished with asphaltic plastic weatherproofing.

4. Weather-resistant jackets should be inspected for holes, torn and loose laps, loose or broken wiring, and any other deterioration. Any needed repairs should be made



Less MOTOR CLEANING ...INSPECTION...OVERHAUL!

HERE'S A MOTOR that actually blows itself clean! Dirt is carried away by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers tefc motor.

Dirt can't build up to cause overheating. Concealed air passages and pockets have been eliminated. Even oily dirt that sticks can simply be wiped or blown off.

And this means savings! Maintenance costs are traditionally low on totally-enclosed, fan-cooled motors. But they're lower than ever before on the new Allis-Chalmers Type APZ tefc motor.

Rigid Construction

The frame is cast iron which has high resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed, fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Distributor or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

A-3426

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.

Why it pays to be a

DART UNION MAN!

This True Ball Joint Makes the Difference

Precision-ground to a perfect sphere, the true ball joint of a Dart gives a snug, drop-tight fit — quickly, easily. You don't have to put your back into it — fuss — or lose valuable productive time when installing. Yes, and they uncouple as quickly . . . ready for re-use — for Darts have more lives than a cat! (Seats stay clean and unmarred.)

Darts are a better buy also because their *bronze-to-bronze* seats offer maximum resistance to pitting and corrosion — their body and nut of high-test, air-refined malleable iron are practically indestructible.

For these and other reasons you'll agree . . . once a Dart Union man, always a Dart Union man!

DART UNION COMPANY
Providence 2, Rhode Island
The Fairbanks Co.—Distributors
Boston New York Pittsburgh

DART
UNIONS

promptly. In the case of weather-resistant plastic finish on flanges, fittings and valves, any cracks or dents should be sealed with fresh plastic weatherproofing.

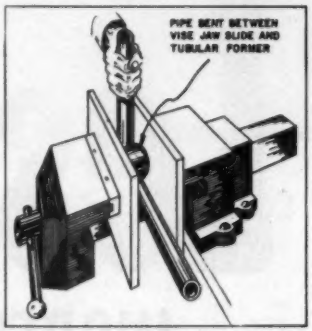
Simple Pipe Bender

Contributed by F. E. Riley

A SIMPLE BENDER for small diameter pipes and tubes can be made with a round former, a pair of flat steel plates, and a bench vise.

A short piece of heavy gage tube or a plain steel blank cut from a bar of suitable diameter is used as the former. This former should have a diameter twice the radius of the bend required. The length of the former should be 1/16 in. greater than the diameter of the pipe to be bent so that when it is sandwiched between the pair of flat steel plates and gripped in the vise jaws, the pipe can be manipulated freely.

One end of the pipe makes contact



Sketch is distorted purposely to show how the plates and former fit in vise jaws to permit bending of the pipe

with the vise jaw slide and the free end of the pipe is gripped by hand and can be pulled around the former to make the desired bend. When short or tough pipes are to be bent, a length of strong tubing can be placed over the free end of the pipe to act as a lever.

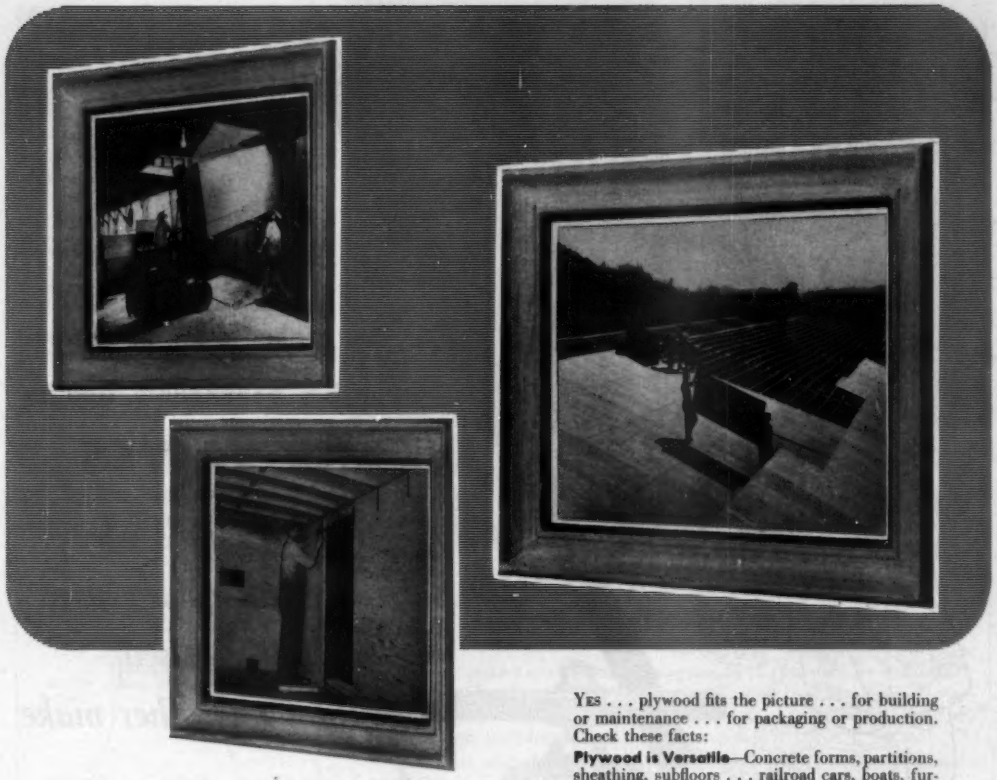
Heating Cable Keeps Runways Free of Ice and Snow

CONCRETE CRANE and transport runways are kept clear of snow after installing heating cable at the South Milwaukee plant of the Bucyrus-Erie Co.

The installation, comprising 40,000 ft of General Electric flexible heating cable, covers four concrete runways from 100 to 275 ft in length and about 10 ft wide.

Step-down transformers, to supply correct voltage for the non-standard lengths of heating cable, were built especially for this installation. This required secondary voltage is about 180 v for the shortest runway and about 500 v for the longest.

The heating cable is laid on wire



PLANT, PRODUCT OR PACKAGE

Plywood Fits The Picture

YES . . . plywood fits the picture . . . for building or maintenance . . . for packaging or production. Check these facts:

Plywood is Versatile—Concrete forms, partitions, sheathing, subfloors . . . railroad cars, boats, furniture, fixtures . . . shipping cases, luggage, crates, containers—these are only a few of plywood's thousand-plus uses.

Plywood is Adaptable—Lends itself to speedy fabrication. Works with ordinary tools. Won't split, puncture, shatter. Use it where you need great structural strength—take advantage of its light weight in products to be flown or moved. Or feature its real wood grain for applications in which appearance counts.

Plywood is Economical—To its low cost, add time and labor savings, long service and lower shipping and assembly costs because of large size, light weight.

Plywood is Available—Count on plywood to help you *right now*. See your regular source of supply. For information or technical assistance, write (USA Only) Douglas Fir Plywood Association, Department 4711, Tacoma 2, Washington.

AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

Douglas Fir Plywood

Douglas fir plywood is real wood made by "unwinding" giant logs . .

. . . into thin wood sheets which are inseparably cross laminated . . .

. . . to form large, light panels having beauty and great strength

piping repairs cost more now!

You make fewer of them by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make

Preferred for true, tight seating

For smooth, positive regulation of flow, check Crane quality engineered Iron Body Globes with composition or metal disc. They're easy to operate; easy to maintain. Guide stem under disc assures square seating ... true disc travel with minimum vibration. Seat rings are screwed in and can be renewed if necessary.

These rugged valves require little maintenance. Roomy stuffing box with bolted two-piece gland keeps tight stem seal, lengthens packing life. Stem threads are outside valve body, easy to lubricate.

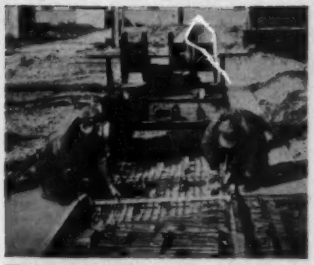
Ask your Crane Representative to show you how Crane Quality valves and fittings not only give you more dependable piping performance ... but cost less in the long run.

Crane No. 351 125-Pound Iron Body Globe Valve

CRANE CO.

General Offices:
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

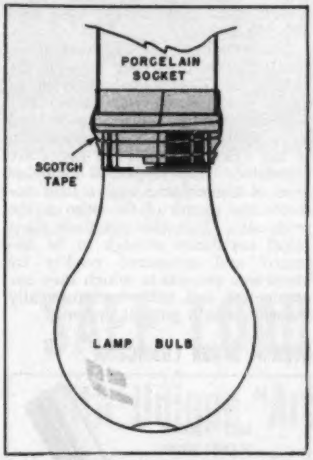
VALVES • FITTINGS • PIPE • PLUMBING • HEATING



Workmen install heating cable in the concrete crane and transport runways to keep them clear of ice and snow

mats about 2½ to 3 in. below the surface and on approximately 3 in. centers. Tile drains installed along the edges of the runways provide adequate drainage for the melted snow.

Secure Lamp Bulb Isn't Bothered by Vibration

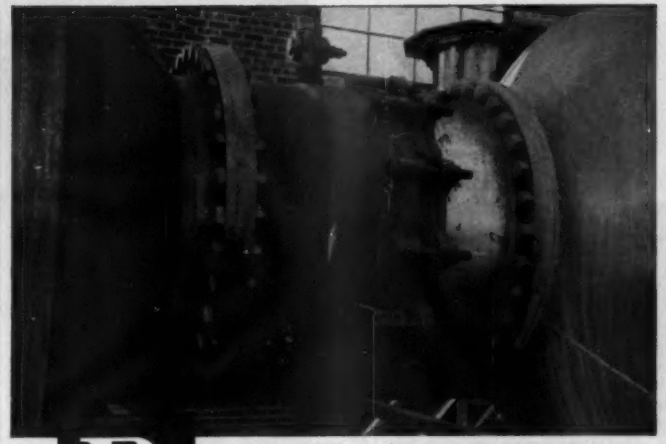


Where vibration is present, lamp bulbs sometimes back loose in their sockets and cause damage to the socket contacts, due to the resultant arcing. This condition can be eliminated by simply wrapping a couple of layers of friction or scotch tape around the neck of the lamp bulb and the socket, as indicated

Electronic Crane Weighs Big Equipment

ELECTRONIC crane scales activated by the bonded resistance wire strain gages simplify the weighing of massive parts and equipment for the Transformer and Allied Product Department of General Electric Co. A resistance wire strain gage load cell of 300,000 lb capacity is built into the crane hook.

A portable weight indicator and accessory reels of electric cord for connection to load cell units and convenient power supply outlet are



℞ for steel mill gas pains

ADSCO Expansion Joints

Just What the Doctor Ordered

In most coke oven gas mains, expansion is absorbed by a series of unwieldy disc diaphragms fabricated directly into the lines. However, these installations often prove unsatisfactory because of limited contraction, ruptures, shutdowns for repair, etc.

Last year, after detailed study, a large steel mill in the East selected ADSCO Piston-Ring Expansion Joints. Eight 36" and five 24" slip-type joints, with 8" traverse and special piston rings, were installed in lines carrying coke oven gas at 200 F. and 25 psi.

This installation proved so successful and so satisfactory in service that more ADSCO Piston-Ring Expansion Joints are now on order for similar applications.

For 75 years, ADSCO has prescribed the *best* remedy for *every* pipe-line expansion problem. ADSCO made the first expansion joint . . . ADSCO now makes the most complete line of expansion joints available from any manufacturer. When *your* problem is pipe-line expansion, why not profit by the experience of hundreds of other companies? Consult ADSCO.

ADSCO Piston-Ring Expansion Joints can be packed under full line pressure. They are made in a complete range of sizes for pressures to 400 psi or greater and temperatures to 750 F. or higher. For further information, write for Bulletin No. T-35-15.

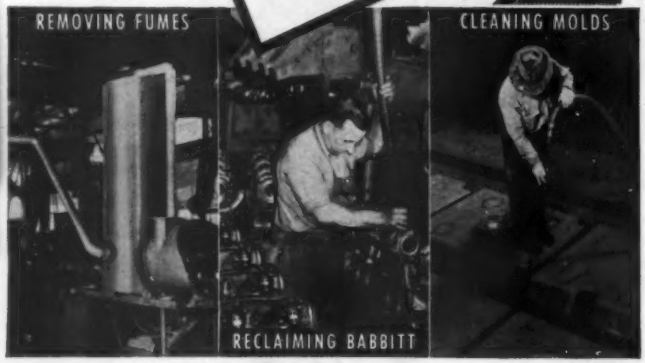
In addition to more than 6500 standard models of slip-type joints, ADSCO makes complete lines of *Corruflex* Packless Corrugated Expansion Joints and Variator diaphragm-type Expansion Joints.

AMERICAN DISTRICT STEAM COMPANY, INC. ★ North Tonawanda, N.Y.

Doing the Impossible in a Jiffy [WITH SPENCER HARTFORD VACUUM]

When you pick a ton of babbitt a day out of engine heads, or remove specks from the bottom of a foundry mold, or eliminate welding fumes at their source with industrial vacuum, you are doing things that cannot be done by other methods.

That is one reason why more than 100 applications of Spencer Vacuum were accepted as essential during the last World War. And with the same machine you get plant sanitation as an extra dividend at no extra cost. That is why you should ask for the Spencer Bulletin No. 144 describing more than 100 essential and unusual applications.



427-C

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

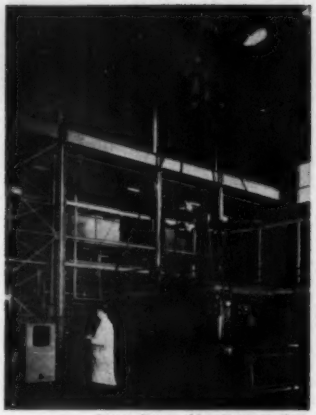


Photo: Baldwin-Lima-Hamilton Corp.

Electronic crane scale indicates weight of power transformer on the indicator

carried on a rubber-tired hand truck. The indicator has three scales: 0–50 tons, 50–100 tons, and 100–150 tons.

The principle of weighing electronically on the crane scale is the change of electrical resistance of grids of wire finer than human hair when subjected to strain transmitted by a short load-supporting column to the sides of which the gages are cemented. Imperceptible compression of the column under load reduces the length of the wire in the grids also. This changes their electrical resistance enough to be detected and measured readily by electronic circuits to which they are connected, and to be automatically translated into pounds or tons.

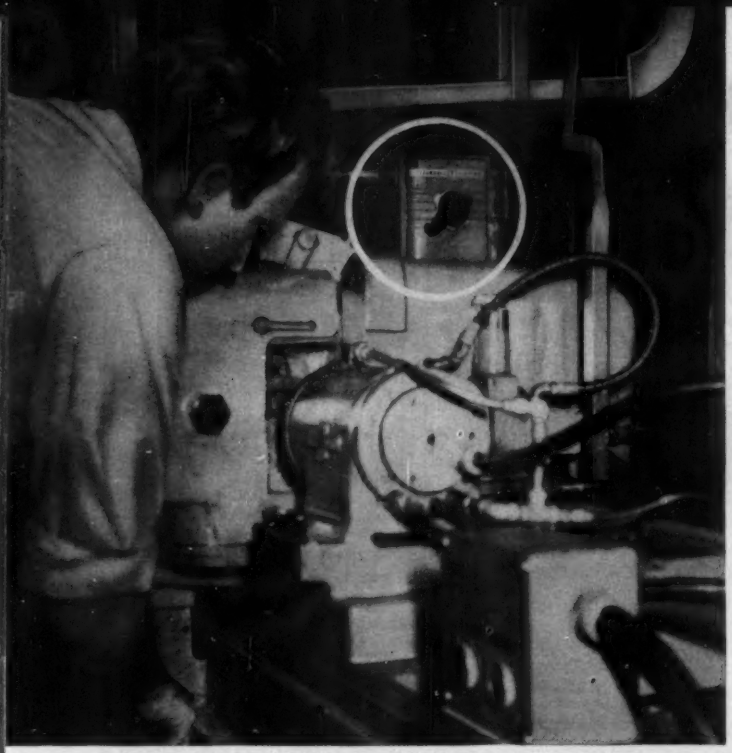
Stencil Brush Lubricator

A self-feeding stencil brush filled with a thin lubricant is a very useful tool for lubricating machine drive chains

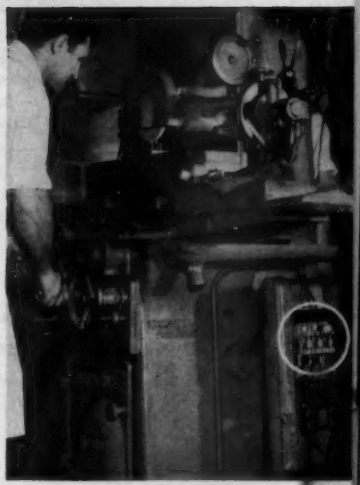
Towing Apparatus Simplifies Freight Handling

Contributed by Paul C. Ziemke

WHILE THE technique of palletizing goods in transit is gaining in popularity, there remains a large volume of freight that must be moved without the benefit of pallets.



IN SAFETY SWITCHES—Marlin-Rockwell Corporation's ball bearing factories use 30 ampere HCI switches as disconnects for high frequency motors used to power internal grinders. HCI interior is removable for easy wiring and inspection. No exposed live parts when switch is OFF and door open. Underwriters' Laboratories Approved.



IN COMBINATION STARTERS—Rugged, simple construction of HCI is perfectly adapted to use as disconnect in combination starters.

SAFE LOAD BREAKING

with Unique "Arc-Quench" Action

For the first time in a safety switch, magnetic repulsion is used to break load quickly, safely.

In Trumbull's HCI (High Capacity Interrupter) Type A switch, double-break contacts are projected and withdrawn with piston-like speed and force. The arcs repel each other and strike against grid pins, breaking into smaller arcs which cool rapidly.

The unique arc-quenching action provides safety, lengthens contact life by preventing pitting, and gives the switch much greater life expectancy. HCI withstands heavy short circuits without damage.

Its initial success as a safety switch has led to its adoption for use as disconnect in combination starters, control centers and switchboards.

Write for Bulletin TEC-10 which describes the HCI fully.

IN SWITCHBOARDS AND CONTROL CENTERS—Compact 30 and 60 ampere HCI switch interiors can be mounted in twin switchboard units (100 ampere HCI takes same vertical space), saving trough space and providing dependable short-circuit protection and sure ON-OFF handle indication.

TRUMBULL ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

HEAT EXCHANGER GASKETS

Accurate reproduction of dimensions assures perfect fit, long trouble-free service.
• Extreme accuracy, painstaking care in every detail, and know-how—born of years of gasket manufacture—are your guarantee of satisfactory performance. Ask for estimates on standard and special shapes.
½ inch radii at all rib intersections maintain smooth continuous metal lap—no wrinkles or cracks to cause leakage.

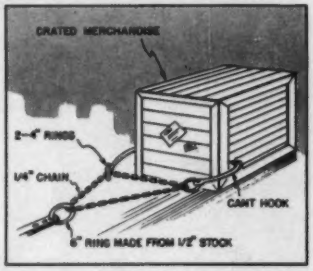
Double-jacketed metal-asbestos heat exchanger gaskets are available in copper, steel, stainless steel, monel, aluminum, etc.

UNITED STATES GASKET COMPANY

648 N. 10TH STREET, CAMDEN, N.J.

LEADING FABRICATORS OF "TEFLON" FOR THE CHEMICAL, PROCESS AND ELECTRONIC INDUSTRIES

Because of numerous injuries from handling such crates in the cramped space of a box car or trailer van, our safety department devised this apparatus to make the job easier. Formerly, a man crawled over the crates to slip a cable around the foremost crate. The safety department felt that a better technique

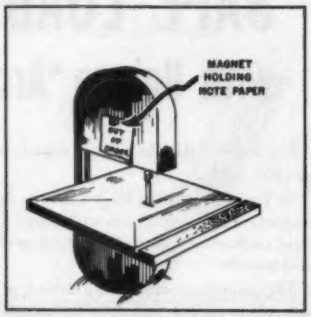


Towing device simplifies the task of removing large crates in cramped space

for fastening the tow line would eliminate the crawling over stacked freight and the job of working the cable down around a crate.

The towing apparatus consists of two cant hooks, of the type used by loggers, with 2—4 in. welded rings that pass through the eyes. Fifteen feet of ¼ in. link chain is threaded through these rings and through a 6 in. diameter ring which hooks onto the industrial truck that does the towing. By this method the hooks are merely attached to two front corners of the crate, then it can be easily towed out of the car or van.

Magnetic Memos



Here is a clever idea for placing a "warning," "out of order" or "how to operate" note on a machine in the plant. A piece of magnet does the trick

Identifying Lubricants

To EASILY identify the lubricants in grease guns, where more than one gun is used, attach a metal tool check (numbered or blank) to the stem of the gun with a double ring or link made from wire.

Where numbered tags are used, the tag number can identify the lu-

WHEREVER ACCURACY COUNTS...

You Can Count on...

CLIMAX
BS&B
CONTROLS

SUN OIL COMPANY'S big, modern Natural Gas plant at Delmita, Starr Co., Texas —where 99% of the automatic valves and controls are Climax.

For control of pressures, temperatures, levels and flow—industries look to Climax Controls for the exacting reliability they require.

Accuracy is initiated at the BS&B Climax Controls division, where every control and valve must undergo rigid tests before delivery; and where engineers, metallurgists and laboratory technicians are constantly exploring and developing new materials, new methods, new and improved products, and new ideas.

In the Oil, Gas, Chemical and Petro-Chemical Industries, especially, the name "Climax" has become synonymous with efficiency and trouble-free performance.

The employment of Climax valves, controls, regulators or relays have in many cases eliminated manual operations, varied, increased or multiplied the functions of equipment, supplied additional safety factors and reduced the supervisory requirements. At BS&B headquarters a large Climax engineering staff is available to assist you with your problems. Your inquiries will be treated in strict confidence.

Write today on your company letterhead for latest issue of the Climax Controls Catalog.

BS&B

BLACK, SIVALLS & BRYSON, INC.

Climax Controls Division, Dept. 60-P

7500 East 12th Street Kansas City 3, Missouri

Wanta pump something at lower cost?

CHECK HERE

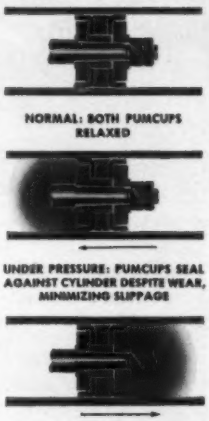
Air	Dye Solutions	Latex	Salt Water
Alcohol	Edible Oils	Mash	Shortening
Ammonia	Ethane	Methane	Sludge
Beer	Fish Oils	Milk	Soap
Benzol	Formaldehyde	Molasses	Sodium Chloride Solution
Boiler Feed Water	Fresh Water	Naptha	Sodium Silicate
Brewer's Mash	Gas, Manufactured	Nitric Acid	Sodium Sulfate Solution
Butter	Gas, Natural	Nitrogen	Starch
Butane	Gasoline	Oil, Crude	Sulphuric Acid
Cane Syrup	Glucose	Oil, Refined	Sump Water
Calcium Carbonate Slurry	Glue	Oxygen	Sweet Water
Calcium Sulfate Slurry	Glycerine	Paint	Tomato Juice
Casein Solutions	Glycols	Potassium Hydroxide	Varnish
Cement Slurry	Hydrochloric Acid	Propane	Vinegar
Chocolate	Hydrofluoric Acid	Raw Boiler Feed Water	Viscose
CO_2 Gas	Ink	River Water—Dredging Operations	Water (various)
Crude Oil	Jam	Resin	Wax
Dairy Products	Jelly		Whey
	Ketchup		
	Lacquer		

THIS list of fluids will give you a rough idea of the diversity of pumping jobs in which Darcova Pumcups are responsible for really *big* savings.

It boils down to the fact that Pumcups all but eliminate fluid slippage *throughout* their life span . . . and they *last many times as long as other packings.* Think of the down-time avoided, the production gains due to prolonged high efficiency, and the time-and-money-saving reduction in maintenance!

Years of application research have gone into the development of Pumcups. Made today in standard as well as many special compositions and textures for a wide range of temperature and pressure conditions, they offer you superior cost-cutting service in virtually *any* pumping job, simple or tough! And they're available in diameters from 1 to 20 inches.

DIAGRAM OF DARCOVA PUMCUP ACTION (greatly exaggerated)



NORMAL: BOTH PUMCUPS RELAXED

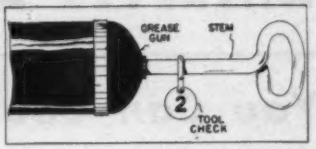
UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE

SEND FOR FREE BULLETIN

Why not weigh *all* the facts? Bulletin 4401 covers Darcova Pumcups for reciprocating pumps; Bulletin 4502 on Pumcups for air or hydraulic mechanisms. Write for yours today.

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 14, PA.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS



An easy way to identify lubricant in grease gun when more than one is used

bricant number. When blank checks are used, the type or name of the lubricant can be stamped on the tag with steel dies.

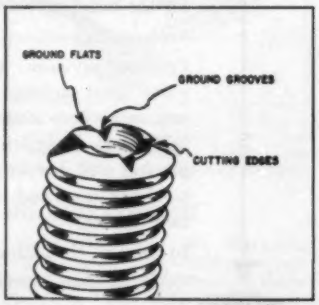
Swivel Wheel Dolly Expedites Pipe Handling

Contributed by Edwin Eisen, Allis-Chalmers Manufacturing Co.

A SWIVEL WHEEL attached to a two-wheel dolly helps expedite the handling of pipe at the plant. Previously, because the pipe tipped the dolly backward or forward, it required two men to load it. Now, with the addition of the wheel, the dolly remains in a horizontal position and one man can easily load it.

By adding swivel wheel, one man can load dolly without fear of load tipping

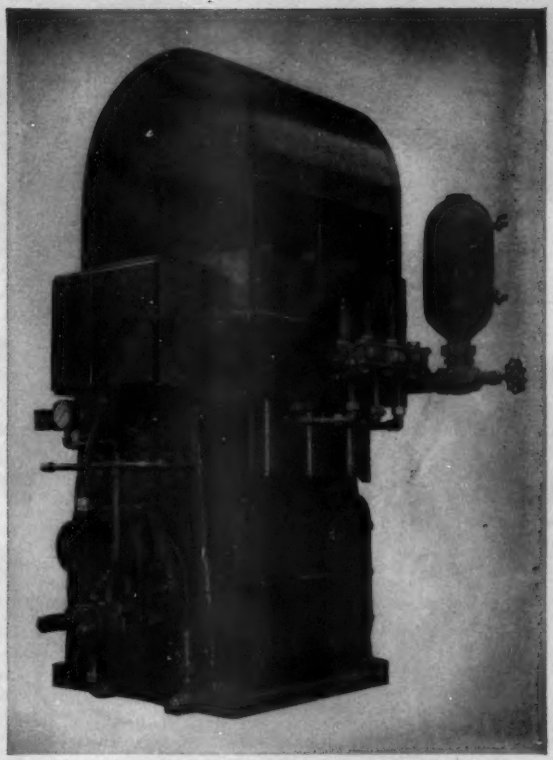
Grind Set Screw For Secure Hold On Shaft



By grinding the point of a cup point set screw, cutting edges will be formed in the hardened steel. These will cut into the softer steel of the shaft when the screw is tightened in its place

PLAY SAFE-

Power Your Hydraulic Equipment with Water... and WORTHINGTON



Worthington VTE pump equipped with unloader, used in hydraulic systems for generating pressures.

Current practice in the engineering of hydraulically-operated machinery shows a trend toward *water*... in order to eliminate the fire and toxic hazard.

Where oil is used, there is always the possibility of explosion and fire due to leaking oil encountering hot metal.

And the pump that's best—most efficient, most economical—for furnishing a central system with water under high pressure is Worthington's high-speed VTE (vertical triplex enclosed).

This constant speed power pump is equipped, for this purpose, with Worthington's suction valve unloader. It is the only high-speed vertical pump on the market with such a device.

Automatic Control for Intermittent Operation

This device, built around an electric synchronizing distributor, unloads each cylinder in sequence, providing quick but gradual decelerating of fluid delivery, from full to zero flow, in not more than one revolution of the pump.

This control is accomplished efficiently on the low-pressure side with no shocks in unloading or loading. It permits operating the pump at speeds of 400-500 rpm.

Complete Line— of Pumps, of Auxiliaries

Worthington makes a complete line of pumps—and auxiliaries too—for all hydraulic power services, including horizontal and vertical power pumps, centrifugal, steam, and rotary pumps. Only Worthington gives you such a range of choice. Manufacturing *all* types of pumps, Worthington can give you the one best type for *your* application.

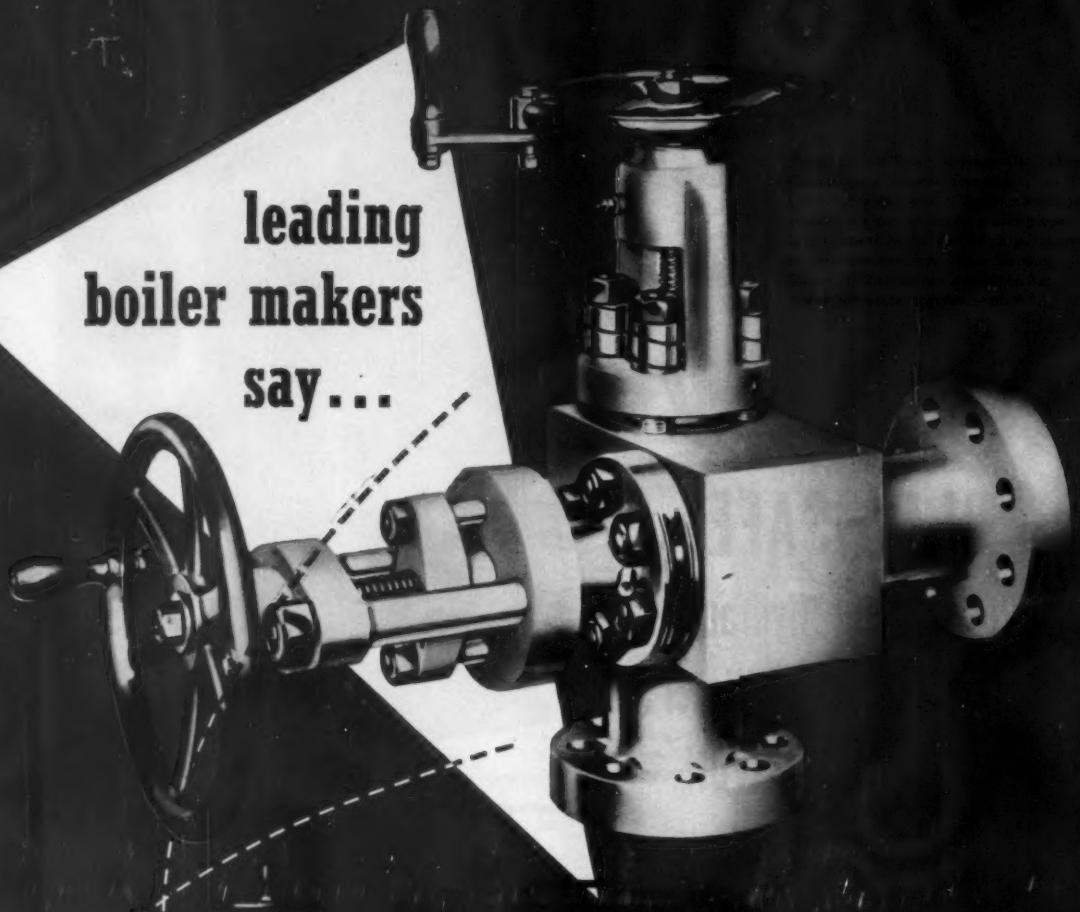
For further description of Worthington equipment for hydraulic systems, information proving *there's more worth in Worthington*, write to Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.

WORTHINGTON

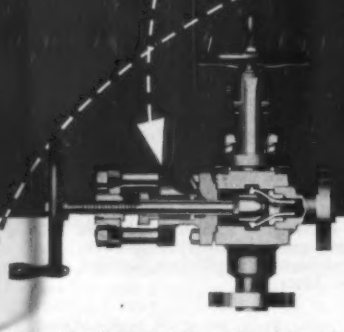
P.I.5

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

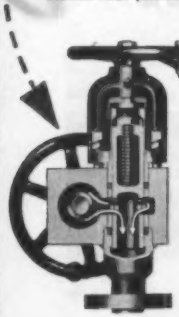
leading boiler makers say...



BLOW-OFF VALVES



Yarway Unit Tandem Valve sectioned through stellite-seat (blowing) valve. Open position.



Yarway Unit Tandem Valve sectioned through seatless (sealing) valve. Open position.

Leading steam boiler makers (names on request) standardize on Yarway Blow-Off Valves . . . for the same reasons that over 15,000 plants use them:

- UNIQUE DESIGN
- MODERN METALLURGY
- RUGGED CONSTRUCTION

} TROUBLE-FREE SERVICE

How these features will help your boiler operation is clearly explained in Yarway Blow-Off Valve Bulletins. Write for one, telling us your operating pressures.

YARNALL-WARING COMPANY 145 Mermaid Ave., Philadelphia 18, Pa.
Branch Offices in Principal Cities

BLOW-DOWN TROUBLES... KEEP BOILERS ON THE GO

How One Plant Safety Committee Goes Into Action

Cooperation of all workers is attained by close contact with them through union representatives and foremen . . . Details of Committee set-up . . . Five objectives adopted by Committee to guide actions and keep them within bounds . . . Survey of accident distribution . . . Examples of results

By **FRED G. HESS, Asst. Plant Engineer**
Camden Forge Company, Camden, N. J.

RECENTLY, the Plant Safety Committee at Camden Forge Co. felt that it could use more help to put across its program. It addressed the following notice to nine key supervisory employees:

"You have been appointed an Associate Member of the Safety Committee. A badge is enclosed for your use in this connection.

"Will you please do all in your power to promote safety and to try to create safety consciousness with all your men?"

These Associate Members were needed to spread the good word about safe practices and safety. The above announcement typifies things that the Plant Safety Committee has been doing during its first year of existence.

The line-up for safety now includes six Safety Committee Members and nine Associate Members. The six-man group is composed of the Vice President in Charge of Production, Superintendent of Forging, three worker representatives, and the Chief Plant Engineer. The latter was appointed by the president of the company to serve as chairman of the group.

The Committee meets every other Monday afternoon at 2:30 p.m. If Monday falls on a holiday, the meeting is held the succeeding day. In the absence of a member of the group a substitute may be appointed to act in his stead.

Special meetings may be called in an emergency. Recently, such a situation arose. A device was needed to stop railroad cars from drifting into building doors. The members met in the yard of the plant to examine a rail clamp.

The clamp was sent in for demonstration purposes by a local safety products supply house. It was fitted on the rail and subjected to severe tests. The Committee was pleased with the trial, and recommended the purchase of two similar rail clamps.

When the Committee first met, it adopted five objectives which are:

1. To promote the utmost in safety with respect to shop practices and the use of facilities.
2. To analyze accident reports with a view to eliminating accidents.
3. To promote orderliness and cleanliness at all times.
4. To promote safety-mindedness on the part of all employees at all times.
5. To institute and maintain safety regulations.

One of the first studies the Safety Committee undertook was a thorough analysis of the company's accidents of the previous year. The number of accidents was reviewed as to types: Arm, Back, Chest, Chin, Ear, Eyes, etc.; and as to distribution by departments: Annealing, Electric, Hammer, Machine, Press, etc.

These figures were compiled from a check of Accident Report cards which are filed in the personnel office. The study revealed certain practices in need of correction—where to exert pressure to prevent a recurrence of the same accidents.

A newly-organized safety-goggle program[1] was instituted as a result of this accident analysis. Its procedure was plotted during further round-table planning.

All Accident Report cards have been made available to the Committee. The members recommend that a record be made of any accident no matter how slight. In case a minor injury—a cinder in the eye, a cut, or a scratch—develops into a serious infection, there will be a record of the original wound.

DISTRIBUTION OF ACCIDENTS — 195—

TYPE	ANNEAL	ELEC	HAMMER	MACHINE	PRESS	REPAIR	TEST	TOOL-RM.	YARD	TOTAL
ARM										
BACK										
CHEST										
CHIN										
EAR										
EYES										
FACE										
FINGERS										
HAND										
HEAD										
HIP										
KNEE										
LEG										
NECK										
SHOULDR										
TOES										
WRIST										
TOTAL										

PLANT SAFETY COMMITTEE ACHIEVEMENTS

DATE	RECOMMENDATION	BLDG	REFERRED	REMARKS
3-8-50	1. SAFETY GOGGLE PROGRAM	ALL	HARBESON	COMPLETE
3-8-50	2. EXTRA RUNGS CRANE LADDERS	9	ENGLER	COMPLETE
3-20-50	9. COUPLING PIN LATCHES & SAFETY CHAINS - R.R. CARS	YARD	"	"
4-3-50	20. BELT GUARD GRINDER NO. 43	20	"	"
8-7-50	92. SIGNAL FROM OIL-HOUSE TO BOILER HOUSE	1385	HINSHILLWOOD	NOT FEASIBLE
9-18-50	123. REPAIR FLOOR AT ROTOR FURNACE	40	WARD	COMPLETED
10-30-50	138. TRAINMAN'S LIGHT FOR NIGHT BRAKEMAN	YARD	"	

Background: Form used for report on distribution of accidents. Front: Partial list of Camden Forge Co's. Plant Safety Committee achievements in 1950

[1] See "The Eyes Have It!" by the author, PLANT ENGINEERING, May, 1951, page 66.

ACCIDENT REPORT

Date: .....Time: .... Shop .....

Name .....Badge No. .....

Cause of Accident: ....

.....

.....

.....

Nature of Injury: .....

.....

.....

.....

Disposition { HOSPITAL ..... / HOME ..... / RETURNED TO WORK ..... }

Card to be signed by Foreman of Shop and returned to Main Office.

Form 031—3-47—1M. .....

Accident report which is filled in, signed by foreman, and returned to main office. Any injury incurred on the job, no matter how slight, is reported

The Committee advocated the erection of a safety bulletin board in the yard of the plant and the placing of other bulletin boards at strategic locations in the shops. These boards are used to inform the workers of the doings of the Safety Committee, and of other information conducive to the idea of safety.

The meeting-table of the Committee provides an excellent example of management and worker cooperation. Safety matters are discussed in normal parliamentary manner and actions are recommended.

The Chief Plant Engineer, as Chairman of the group, leads the discussion, and records the minutes. After each meeting, he prepares the minutes and distributes them to each member of the Committee. Suggested actions are also addressed to various foremen involved. Usually, these notes are prepared for the following departments: Electrical, Mechanical, Yard, Pipe Shop, and Machine Shop.

A continuous list of conditions in need of correction is kept. The list shows in columnar form: the date the recommendation was proposed, the recommendation, the location, the foreman to whom referred, and disposition. Each Safety Committee member has a copy of these notes for his own reference. These provide a constant check of Safety Committee operations, and insure immediate follow-up of every idea.

For Example:

Safety Committee activity has effected many worthwhile changes around and about the plant. A sampling of these is as follows:

1. Traffic control by local police during rush hours at a dangerous highway crossing adjacent to the main gate.

2. Warning signs placed on all out-of-order equipment. Tripod signs which warn foot traffic of men working overhead.

3. A renewal of safety equipment—coupling-pin latches and safety chains—on company railroad cars.

4. Repair items—benches in washrooms, steps at pit of press, floor at planer, shop doors, etc.

All Members and Associate Members of the Safety Committee wear badges to make them readily identified. New or re-hired employees are briefed by a member of the body. They are reminded to wear their safety goggles, to stand clear of crane-loads, and to become safety-conscious.

For the most part workers and management have cooperated splendidly with the Committee. Management has rejected a few of the Committee's proposals because of the prohibitive cost involved. Most recommendations do have a good, sound ring of safety-alertness on the part of the members of the Committee.

In the first ten months that the Safety Committee has been operating, there has been a most significant reduction of accidents in the plant. It is generally felt that the efforts of the group are instrumental in some way for the satisfactory results.

The aims of a properly spirited Safety Committee can be true to the mark. Each employee must be encouraged to contribute willingly for the betterment of the plant. His job—his very life—may depend upon his acceptance of that responsibility.

"What should I put on this report, Higgs? Carelessness, stupidity or ignorance?"

Who's Kidding Who About Costs?

Cost accounting—or the lack of it—is a sore point with plant engineers . . . Here an accountant turns the tables — accuses engineers of non-cooperation and lays out his own PM program . . . How about working together on this?

ONE OF THE COMMON complaints of plant engineers is the difficulty of obtaining adequate cost data and failure of the accounting department to appreciate the need for cost breakdowns which will be of value in cost reduction studies. Some have even gone so far as to set up and carry on their own cost system.

In general, maintenance budgets are tied in with direct labor on a formula or ratio established many years ago. Increased use of automatic machinery cuts down the direct labor costs but the complicated machinery greatly increases the maintenance costs thus leaving the maintenance department behind the eight ball.

Another difficulty is the frequent practice of lumping together for simplified accounting many indirect costs which should not be in the maintenance budget.

It is surprising how frequently the maintenance crew is called in to do direct production work or work on new installations. This practice of using labor and facilities for the best over-all result is desirable. The accounting setup should, however, recognize the difference if for no other reason than accurate cost accounting practice.

It is quite likely, however, that plant engineers themselves are partially to blame. This is well shown by the article in the adjacent columns. This was reproduced from the June 1951 issue of the N.A.C.A. Bulletin, the official publication of the National Association of Cost Accountants. Why should an accountant have to lay out a preventive maintenance program? On the other hand why should a plant engineer have to set up his own accounting procedure?

Because this question of interdepartmental operation is so important to all companies, and the relationship between accountants and plant engineers is so poor, we will welcome comments and suggestions from both sides.

Send in your opinion. This is a subject that should make as good a discussion as "Maintenance By Contract."

THE COST FORUM

ADVANCE PLANNING AND CONTROL OF MAINTENANCE

Editor, N. A. C. A. Bulletin:

N. A. C. A. Bulletin

JUNE, 1951

W. T. BRUNOT, *Richmond Chapter*

PERHAPS one of the most fertile fields for the reduction of costs is to be found in the maintenance department. The work done by this department is performed by skilled, highly-paid employees who often have to work overtime at premium rates, and the equipment used is usually expensive. Plant shutdowns for repairs are even more costly. Hence, efficiency and the proper control of operations in the maintenance department are especially important.

Accountants are not generally expected to know much about maintenance. Engineers and production managers are entrusted with this responsibility and are presumed to be exercising the vigilance which enables our industries to turn out matchless records of production efficiency. However, the accountant's ability to plan procedures and to control costs by such planning can be especially valuable to management in reducing maintenance costs. One of a plant accountant's more important duties should be to assist the operating and maintenance personnel at his plant to coordinate their efforts in planning and systematizing maintenance operations so that they will be adequate, timely and efficient.

Although most plants schedule their maintenance work so that the semiskilled labor is used where higher skills are not needed and may also have spare or stand-by equipment for use when breakdowns occur, managements in relatively few plants look ahead to future maintenance in any sense which could be designated as planning.

A readily understandable example of advance maintenance planning is illustrated by the maintenance charts furnished to new car purchasers by some car manufacturers. An excerpt from one of these charts is shown below:

Lubricate	every 1,000 miles
Check master cylinder	every 2,000 miles
Check wheel alignment	every 5,000 miles
Tune engine completely	every 10,000 miles

Simple, isn't it? Yet, how many plant maintenance departments have such a chart for each machine in their plants, showing the work to be done to the machine at planned intervals. Or, if such charts have been prepared, the work may not be spaced so as to keep the machines (and the maintenance department) operating at the lowest possible cost.

The accountant can, with the proper cooperation of plant operating personnel, prepare such a chart and assist in ironing out the related scheduling. He can then take the next step in maintenance cost control by assisting in the determination of the standard time required by each recurring maintenance job. To illustrate this point another example is taken from the automobile industry. Automobile repair work has been studied (as indicated in the source material we are using) and the following standard required time has been determined for the repair jobs shown:

Replace master cylinder	1.3 hours
Replace rear wheel brake cylinder	.8 hours
Overhaul rear wheel brake cylinder	1.1 hours
Replace clutch and brake pedal bushing	2.7 hours

Additional steps to be taken by the accountant to complete the control of maintenance costs would be as follows:

1. **Productive equipment, indirect department areas and service departments should be adequately identified through a reliable chart of departmental accounts. Where several units of productive equipment are combined in one cost center, the individual items of equipment should be identified, so that the cost of maintaining each can be determined.**

2. **Daily labor tickets should be summarized in the form of a daily report which is prepared by the maintenance department and signed by the maintenance superintendent. This summary can be used by the accountant as a basis for distributing maintenance costs. The use of a daily report places the responsibility for the control and reporting of maintenance costs directly with the maintenance superintendent. He has directed that the work be done and has approved (daily) the expenditures which have been incurred. He is, therefore, in the best position to answer all questions from others relating to the correctness or the extent of maintenance expenditures in any department.**

3. **Where the local management approves the issuance of departmental expense reports to departmental supervisors, it is desirable to segregate the cost of maintenance labor on these reports, so that the operating department heads can review it as a separate item and confer with the maintenance superintendent if they have any questions.**

4. **A maintenance budget should be approved in writing by the operating and service department heads as well as by the maintenance superintendent.**

5. **Management should be furnished with a report each month comparing actual maintenance with budgeted maintenance (showing both work done and costs incurred), so that it can see what was accomplished in each department.**

Keep Your Maintenance Budget Intact by Close Estimation of Small Project Costs

For in-plant construction, as well as for major projects, obtaining of construction funds on an appropriation basis is necessary if maintenance funds are to be used for maintenance . . . Example given by author of procedure followed on installation of well, pump and discharge line in a paper mill . . . Judgment, experience are necessary

By **HAROLD E. B. ANDERSON**, Construction Engineer
United States Gypsum Company

MANAGEMENT IN GENERAL regards costs as a measure of success; thus, cost control is a necessary function in the operations that the plant engineer supervises.

Maintenance, being relatively repetitive, lends itself to prediction of costs. Construction, however, whether it involves building changes, new equipment installation, materials flow revision or relocation of equipment, is rarely routine. In-plant construction, with which this article deals, is carried out in many plants on an appropriation request basis.

Separate from Maintenance

In this system the plant staff outlines the proposed work, the reasons for the work and the savings or production increases. These facts and figures are then written up as a request for funds in addition to the over-all maintenance budget. Since management approval of the request limits the available money to that estimated at the plant, an estimating system of considerable accuracy is invaluable to the cost-conscious plant engineer.

Any addition or change in mill equipment involves existing facilities in addition to that equipment directly concerned. Wall openings may be cut, pipe lines rerouted, production units relocated or auxiliary equipment moved. In many cases, additional planning is necessary in scheduling equipment out-of-service to permit relocation or rebuilding.

In-plant construction is undoubtedly more readily estimated than is the construction of a building or a complete plant. The problems of material procurement, labor distribution and stretching of the construction dollar lack only magnitude, however, in a comparison of in-plant and major construction.

A typical example of cost estimation on a comparatively small project can be found in the recent installation of a well, pump and discharge line to storage in a paper mill. Although this project required the use of outside contractors, it represented the type of cost estimation applicable to construction work.

Preliminary design factors of depth and flow were determined by inspection of the drilling log of a well previously drilled on the property. Minimum hardness of the water was of uppermost concern and a flow of 150 gpm was desired. Since the test well had shown minimum hardness at 300 ft depth, this was chosen as the primary depth of the well.

First action taken was to obtain preliminary bids from firms qualified to drill the well. Two such firms were contacted and their bids were compared. Both of the bidders used a cost per unit bid—cost per foot drilled, cost per foot drilled and cased, cost per hour of testing, cost per installation and removal of the testing equipment. With some minor exceptions, the bids were identical, and readily transposed into a cost estimate.

Bids Vary

One bidder had included the cost of a pump, installed, in his original bid. Inasmuch as this pump was the same unit as that installed on the mill's first well, this pump was chosen for the new well, and its price was entered on the estimate.

An 8 in. discharge line approximately 260 ft long from the pump outside the mill to the fresh water storage chest inside the mill was required. Visual inspection indicated the bends necessary to avoid existing lines in the already crowded basement. The installation of a cleanout tee at the pump head required an 8 in. check valve, an 8 in. gate valve and a 4 in. gate valve. Pipe flanges, including two for an orifice meter in the line, were added to the list of materials. The pump manufacturer recommended a 4 ft by 4 ft by 3 ft concrete pad to support the pump, and materials for this were detailed.

Electrical equipment included the power line, the float switch in the storage chest, pump house lighting, and an electric heater for heating the pump house. Conduit, wire and switches were added to the material list.

Building Contracted

The pump house was built in a corner of the mill building and required only two walls and a roof. The building was designed in brick and concrete to match the mill building, and bids taken from local contractors to construct the building. Finally, instrument manufacturers were contacted for estimates on the flow meter, and the material list was complete.

Labor costs, unfortunately, are not the fixed figures available from suppliers for materials and services. The labor charge on a job is a function of the particular crew involved; hence, experience in supervising or observing the men is extremely helpful in cost computation. Although the wage rates are constant, the return on each labor dollar is calculated not only by the number of hours, but must be tempered by previous association with the men and knowledge of their work habits.

The drilling of the well required no plant force labor, but the concrete pad for the pump had to be poured before the pump could be installed. This job was divided into 1—the excavation; and 2—forming and pouring the pad. The excavation, to be done by hand, was estimated to require two men two

days to complete, for a total of 32 manhours. The construction of the form, of plywood and 2 in. by 4 in. lumber, was figured on the basis of the same two men working 12 hr, or 24 manhours. The pouring, using ready-mixed concrete, required the two men to spread and level the mix for one hour. The job total was 58 manhours; at the existing rate of $2.00 per hour, the cost estimate was $116.00.

The installation of the pump discharge line with its fittings, elbows and orifice meter flanges, was estimated at six working days for the plant "pipe crew" of four men. This amounted to $384.00, again using the $2.00 per hour average wage.

The installation of the orifice and meter, which included securing the recording indicator to the chest wall, and connecting the necessary lines, was carried to the estimate at $80.00.

Load Center Nearby

The electrical work was greatly simplified by the availability of a load center and a lighting panel inside the mill, adjacent to the well location. The float switch control for the new pump motor was installed in conjunction with the existing pump so that the installation required only additions to the existing control wires in the original conduit. The conduit runs were therefore minimized and the labor costs were comparatively small. The power connections were estimated at 64 manhours; the control wiring changes at 48 manhours; the lighting installation at 40 manhours and the heater installation at 32 manhours, for a total of 184 manhours.

The costs on each part of the well installation were combined to obtain the total and the cost estimate was complete.

Equipment: Minor Problem

As this example has illustrated, cost estimation is not an exact science. It must, however, represent the best judgment of the estimator in his attempt to predict future expenditures.

Material and equipment costs, usually obtainable from manufacturers or dealers, present a comparatively minor problem in estimating. The computation of labor costs can be simplified by the division of each project into its components and attaching a manhour or dollar value to each phase. Then by combining the several components, the complete job estimate is resolved. The more detailed the estimate, the greater the possibility of an adequate but not wasteful estimate.

Obviously, if the estimator starts with the smallest practical portion of the proposed work, repetition of the particular work unit on other jobs will permit enlarging the base unit for more rapid estimation.

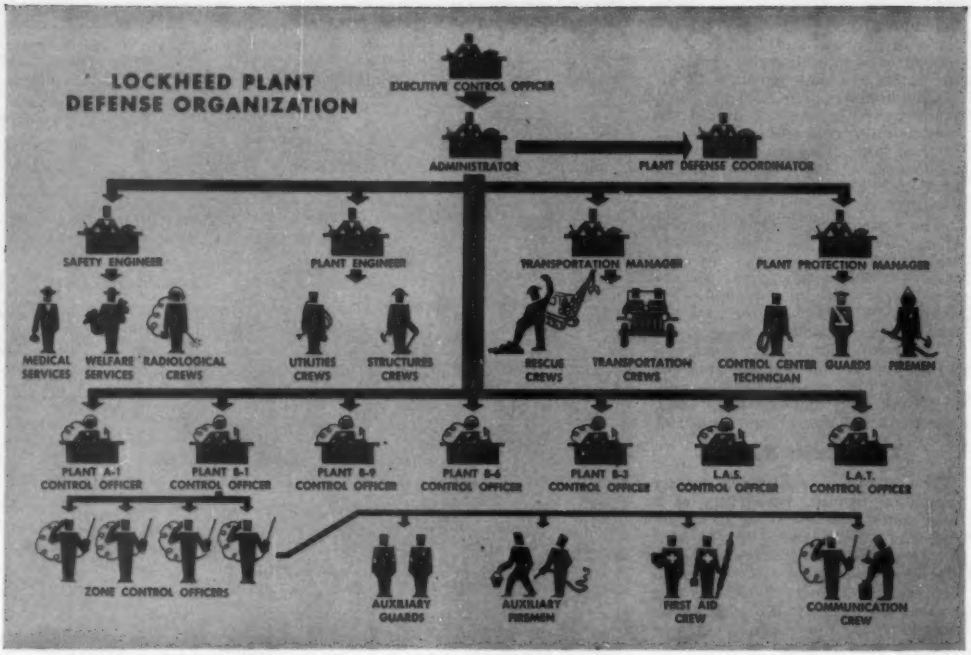
As previously stated, costs are important to the plant engineer. Construction or other special appropriations to abet the maintenance budget offset the need for the budget to absorb any part of the cost of unplanned equipment changes. To assure the plant engineer full advantage of this appropriation feature, accurate cost estimates are fundamental.

DETAILED ESTIMATE UNITED STATES GYPSUM COMPANY PLANT_____ FILE NO._____ DATE_____

DESCRIPTION DEEP WELL INSTALLATION _____ OF_____

DESCRIPTION	UNIT & QUANTITY	UNIT COST MATERIAL	UNIT COST LABOR	MATERIAL	LABOR
1. Well					
Drilled and cased	40 ft	13.25		530.00	
Drilled, not cased	260 ft	6.00		1560.00	
Drive shoe				70.00	
Install. of test equip.				200.00	
Pump test	24 hr	9.50		228.00	
2. Pump					
Vertical pump, 200 ft column					
30 hp motor - installed				3493.00	
Concrete pad					
Ready-mixed concrete	2 yd	15.00		30.00	
1/4" plywood	64 sqft	.18		12.00	
Plant labor					116.00
3. Discharge piping					
8" pipe	260 ft	2.50		650.00	
8" slip-on flanges	8	7.12		57.00	
8" 90° weld ells	4	27.31		109.00	
8" 45° weld ells	4	24.58		98.00	
8" clevis hangers	20	1.35		27.00	
8" horizontal check valve	1	94.00		94.00	
8" gate valves	2	123.00		246.00	
4" gate valve	1	52.00		52.00	
Welding rod	100#	.13		13.00	
Plant labor					384.00
4. Orifice meter					
Flow recorder, complete				450.00	
Plant labor					80.00
5. Pump house					
Pump house, including door				1470.00	
6. Electrical connections					
Combination line starter	1	132.00		132.00	
Circuit breaker	1	43.00		43.00	
Push button station	1	22.00		22.00	
Time delay relay	1	56.00		56.00	
Heater and thermostat	1	130.00		130.00	
Light fixtures	2	6.00		12.00	
Switch	1	2.00		2.00	
#6 wire	75 ft	.26		20.00	
1 1/2" conduit	25 ft	.40		10.00	
1/2" conduit	100 ft	.12		12.00	
Plant labor					368.00
TOTALS				9828.00	948.00

Careful tabulation of each factor entering into any small construction project results in orderly presentation of facts, allows quick re-check of all figures



LOCKHEED
Zones Its Plants for Security

Not all plants will find it necessary to install the 100 per cent security measures that Lockheed strives for, but their pattern has many features that other plants might well copy in part or in whole

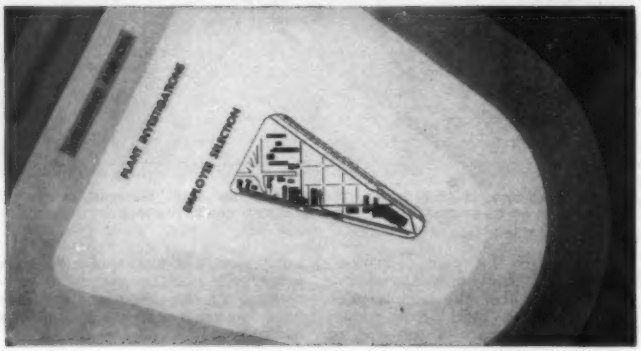
ONE DAY A YEAR AGO, Lockheed Aircraft's management sat down for a special conference. Someone pulled down a wall map of Los Angeles County and began measuring distances between the company's Burbank, Calif., plants and other Southern California aircraft plants, the harbor with its oil-loading and storage docks, the big El Segundo refinery, and between the steel and other heavy industry located in Vernon, east of the city.

Someone said: "Any one of these other areas is a far better target for an enemy A-bomb than Lockheed."

Said another: "But we buy insurance at Lockheed without expecting the place to burn down. We plan ahead for earthquakes, floods and for explosions—like any plant management—not because we ever expect them but because the plan can save lives and property if we are unlucky enough to have a disaster."

Commented yet another: "Remember World War 2 and our auxiliary firemen and rescue squads? Turned out we didn't use them, but if we had needed them at all, we'd have needed them desperately."

Successive, invisible bands of security protection reach far at Lockheed. Physical protection is thoroughly backed up by intensive military and intelligence work



100 Per Cent Effectiveness Required

With this, Lockheed launched a stepped-up plant security plan. Its theme: Lockheed must not only take care of employee safety and company property; it must guard secret information that can make or break the nation's security. This is a problem currently facing many a U.S. plant—and the need has only been emphasized by disclosures at recent A-bomb spy trials. Ninety-nine per

Employees

Fingerprints positively identify employee before he reports for work. Prints also form valuable records

Each new employee has photograph taken for files and own passes. Security officers check background of those on classified work. Right: Showing passes is not enough. Employees open boxes and packages

cent security is not enough. It's got to be 100 per cent.

Lockheed's growing ring of security is geared to: 1—A self-sufficient zone system. By Nov. 15, 1950, Lockheed had set up its security force. Its plant protection manager, Bill Todd, heads communications technicians, guards and firemen. His staff includes 7 plant control officers and seven alternates to cover all plants and subsidiaries in the Burbank area. Plants are divided into 46 zones, each headed by a zone control officer and an alternate zone control officer.

2—Plant defense experts will direct the entire organization from a recently-completed control center. Protected by heavy, reinforced concrete, this center has its own power plant, independent telephone communications with each plant, radio transmitter and receiver, and direct wires to civilian disaster and military officials. With communications linked to all plants, the center can direct fire and damage crews rapidly to any point necessary in the plant.

3—Each zone officer has over-all responsibility for defense measures within his area—all under direction of the plant control officer. Each zone has its own organization of auxiliary guards, firemen, first-aid teams and communications crews. The aim: to make each zone as nearly self-sufficient as possible.

4—Strategic utilities have been protected by concrete and steel walls. Thus protected are new high pressure steam boilers. Electrical

Mobility

Lockheed's transportation fleet is ready for action with some trucks outfitted as ambulances. Others carry first-aid equipment regularly and all drivers have advanced instructions in case of plant-wide trouble. Right: Uniformed guards motor-patrol the plant area and use "walkie-talkie" as radio link with plant protection office for quick emergency action

Guards

Fast instructions are relayed by recently-installed radio telephone to guard cars and fire trucks, another arm of plant protection

Firing practice at pistol range is part of program to keep guards alert and ready for any emergency

Fireman scans vast expanse of rooftops which cover the 5,310,000 sq ft of plant area, all needing protection

transformers have been enclosed in reinforced concrete vaults—both as A-bomb protection and to guard against sabotage.

5—Everyone entering the plant rates a challenge from Lockheed-employed guards. Entrance is restricted to employees and others with legitimate reason — such as vendors, subcontractors, military officers and sales prospects (civilian airlines). General visitors have been excluded since July, 1950.

6—Floodlights, fences, barbed wire —familiar symbols of plant protection—are but a small part of the over-all security.

7—Guards stop all vehicles entering or leaving the plants. Drivers receive clearance cards which must be checked and signed by loading dock attendant and returned to the gate guard before driver may leave warehouse yard.

8—An employee's showing of his pass and badge is not enough. Employees must open lunch pails upon leaving to prove that they are empty. Guards inspect all packages. Special passes are necessary to take out

Training

Special crews are on the alert, know how to use radioactivity detectors, wear special protective suits. Principle behind Lockheed's intensive training program is to develop teams of workers who will respond instinctively in any time of crisis to perform the duties necessary for survival in times of emergency

Forty-six six-man teams have undergone, or are receiving, training in handling first-aid cases with emphasis on A-bomb injury and radioactivity injury

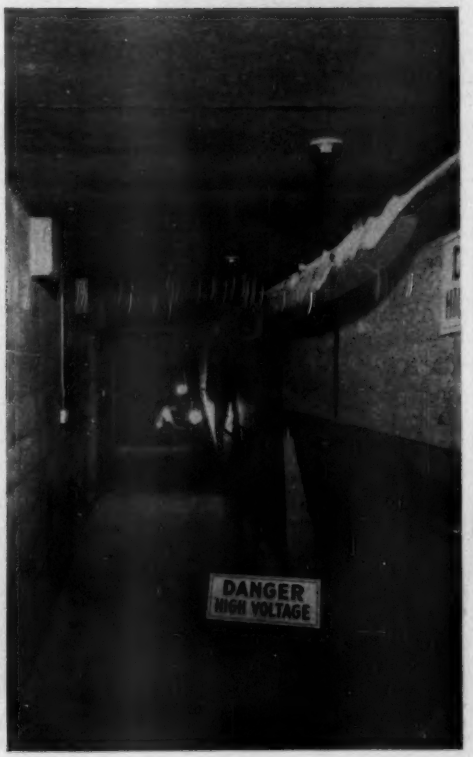
Equipment

Left: Ordinary wastebaskets won't do for confidential material. Contents of these units are emptied into "burn-boxes" at day's end. Center: Records, blueprints, drawings, other classified material is kept under lock and key, can be handled only by certain employees. Right: Highly classified material is housed exclusively in special vaults

Construction

Floodlights, fences and barbed wire—familiar symbols of plant protection—are not enough at the Lockheed plant . . .

. . . special structures for physical protection of certain areas are being built. Right: Reinforced concrete vault designed to protect vital electrical transformers against both sabotage and bombing are shown receiving finishing



company property. High-level approval is required for blueprints and drawings.

9—Only "cleared" employees handle classified material. Classified material is kept under lock and key or in vaults. Special disposal units, not open wastebaskets, are for disposal of all material dealing with classified subjects. Disposal units are emptied, their contents destroyed in burn-boxes.

10—Lockheed has surveyed its 5,310,000 sq ft of buildings, and has selected and marked "protective areas" where employees will have best possible protection in existing buildings in event of A-bomb attack. The company is currently studying advisability of locating atomic bomb shelters—should civilian defense and government officials decide they should be built.

11—Twenty six-man teams have completed basic and advanced first-aid courses. Another twenty teams have begun courses. Four 8-man teams have been trained to handle radioactivity detecting instruments. All medical personnel have completed courses in caring for wounds from A-bomb explosion and treatment of radiation sickness.

12—All members of manufacturing supervision are trained auxiliary firemen; auxiliary guards, appointed by zone control officers, are getting special schooling.

13—Specially-organized structures crews are learning how to clear away wreckage; how to prop up slightly damaged buildings; how to knock down the dangerous ones.

14—Other crews know how and when to cut-off oxygen, acetylene, compressed air, gas, water and power supplies in emergency; and how to turn on reserve power and water supplies afterwards.

15—Special relief crews of riggers, crane operators and bulldozer drivers have completed training in moving wreckage and giving first aid. There are 25 relief crews.

16—Lockheed's transportation fleet—every unit of it—is equipped with first-aid gear, its drivers trained at rescue, and some of the fleet has been outfitted as ambulances.

17—Lockheed has set up a complete organization to deal with threat of atomic or other heavy bomb attack. Said one official: "Probably the basic difference between wartime and peacetime security lies with the men and women who work for Lockheed. Naturally our work —like the work of hundreds of other plants across the country—attracts the attention and efforts of enemy agents. Normal plant security methods, now intensified, make it hard for them to work in the plant. So their stepped-up wartime activity usually takes the form of extra attention to unwary employees." To foil enemy agents, Lockheed regularly holds security courses for employees, cautions against being duped into revealing classified or other material.

18—In a special bulletin to its employees, Lockheed has told them to be vigilant against espionage:

a. "Watch what you say about your job. Our enemy is interested not only in advanced aircraft information but in details of our industrial capacity. This includes classified projects, production schedules, rate of delivery, future production plans, source of supply, use of strategic or critical materials, movements or storage of supplies and materials."

b. "If you handle classified material, follow security restrictions to the letter."

c. "Be on the lookout for psychological sabotage. Don't believe or spread rumors."

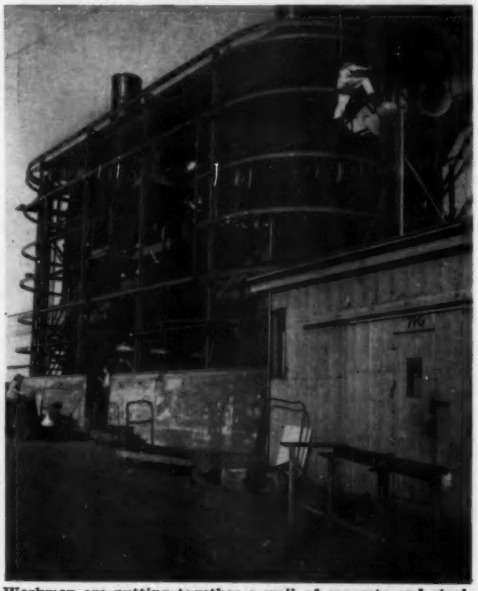
d. "Report suspicious things to your supervisors or to plant protection. We'll keep your information confidential and will follow up each lead. Don't play detective. Leave investigation to the professionals."

e. "Look out for people who have a strange interest in your job or question you at length about your work."

That's the way Lockheed does it, along with additions to its fire department (already numbering three firehouses, 50 men and six trucks—(comparable to a force for a city of of 60,000 persons). It likewise fingerprints each new employee and checks his background and character.

The 64-dollar question: Is your plant buckling down to 100 per cent security with the same vigor as Lockheed? Recent disclosures at the A-Bomb spy trials would indicate that this is, in today's crisis, but minimum security.

Watch towers are good—but, once more, are not enough. Security must begin within the plant, not from outside, and results largely from employee training in pontential hazards



Workmen are putting together a wall of concrete and steel, designed by plant engineering, to protect high pressure boilers and other boiler plant equipment from blast damage

Scheduling and Performing
ELECTRIC CONTROL MAINTENANCE

Establishing the maintenance program . . . Give mechanics opportunity to study manufacturers' literature and instruction booklets . . . Make available adequate stock of replacement parts, plus testing equipment and adequate tools . . . Inspection frequency will vary with severity of service but definite inspection routines should be established for each plant . . . Detailed instruction for maintenance and inspection

By JOHN FOSTER, Maintenance Engineer

AN EFFICIENT PROGRAM of electric control maintenance is necessary to insure the operation of motor driven equipment at maximum capacity. Only in this way can unexpected breakdowns of vitally important production lines be reduced to a minimum.

The first step in setting up such a maintenance program is to establish adequate records of maintenance and repair procedures. An excellent means of accomplishing this is a card file system. Naturally, this should be planned in conjunction with the motor maintenance schedules, so that maintenance of both motor and control can be taken care of at the same time, to minimize equipment down time.

As shown in Fig. 1, the control maintenance file card should list the various inspection and maintenance procedures, with checking spaces to be punched by the maintenance mechanic, using the individual symbol ticket punch assigned to him. This insures individual responsibility for each phase of maintenance on each piece of equipment. The plastic enclosing envelope helps protect the card against excessive soiling.

A card index of this type also affords a means of checking the performance of each controller, since repairs and replacements are recorded. This is important, because a controller that requires excessive maintenance may not be suited to the application and worth-while savings in production and maintenance might be effected by replacing it.

An efficient maintenance program should eliminate unnecessary service interruptions, insure proper equipment operation, and minimize outage time when breakdowns occur. This can only be accomplished through intelligent supervision and thorough training of maintenance personnel.

In order to insure an adequate understanding of the proper operation of various types of electric control equipment, time must be provided in which to study wiring prints, manufacturers' instructions, and to observe the operation of each type of controller and the function of each of its parts when operating normally. This will insure familiarity with controller functions and thus help simplify the location of faults when abnormal operation occurs.

All available instructional literature and wiring diagrams should be obtained from the manufacturer of the control equipment or of the machinery on which it is mounted. Where only regular wiring diagrams are available, it is well to make up straight line or elementary diagrams from the regular ones, as these simplify and speed up troubleshooting of control circuits.

A filing cabinet is advisable for the storage of literature and wiring diagrams pertaining to control equipment, since this will permit material to be quickly located and will serve to minimize deterioration of the material.

Parts, Tools, Test Equipment

Adequate tools, testing equipment and replacement parts should be made available to each member of the maintenance crew. This will insure maximum working efficiency and minimum operating shutdowns. The type of control equipment assigned to each man's care will determine the type tools and instruments to be provided.

It is well to stock a sufficient quantity of required replacement parts at all times. This necessitates a program of inventory and re-ordering based on the average frequency of replacement of each type part. Consideration should also be given to duplication of parts on multiple controller installations. Naturally it is possible to maintain a smaller stock of such parts per controller, since all controllers are unlikely to require replacements at the same time.

A complete set of repair and replacement parts lists should be kept on file for every type of control equipment. An efficient method of stocking replacement parts consists in the use of suitable closed containers, each bearing an identification number. An alphabetical wall chart, listing the container numbers and the respective parts they contain, serves to quickly locate a needed part.

To simplify re-ordering and insure against inadvertent depletion of parts stock, each container should be provided with a small card, giving the catalog number of the parts in the container, the minimum quantity to be kept in stock, and the actual number on hand. Each time parts are removed from a container or the stock is replenished, the number on hand should be correspondingly changed. When this number

Checking the load on motor controller with a hook-on testing instrument

Electrician using test equipment to check operating coil voltage on motor controller

reaches that of the minimum quantity to be kept in stock, the card should be removed temporarily and used to re-order additional parts.

Inspection Frequency

Maintenance inspection frequency will depend on the severity of service of the control equipment. Obviously, the more often a device operates the greater will be the rate of wear. On the other hand, devices that operate very infrequently may develop trouble caused by sticking of operating parts or oxidation of contact surfaces. Therefore, it is usually advisable to base inspection frequency on conditions found in actual practice. However, a rule-of-thumb suggests monthly inspection for apparatus that operates no more than four times daily. Where operation is more frequent, or other factors prevail, inspection weekly, or even daily, may be necessary, depending upon individual conditions. Since oil immersed contacts have a much shorter life than those operating in air, such apparatus should be inspected more frequently.

Before attempting any inspection of control apparatus or other electrical wiring, device or equipment, make absolutely certain that the feeders are dead, and that the disconnect switch is locked in open position, and that only you have the key. Preoccupation with inspection details makes a mistake not only possible but probable, and a mistake can easily be fatal.

During each inspection, see that all parts of the controller, both operating and non-operating, as well as the enclosing case, are free of dust. Dry dust accumulations may be removed with a dry air stream of about 50 psi. Oily dust and grease should be removed with a cloth or brush moistened with petroleum distillate.

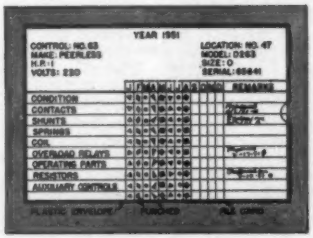


Fig. 1. Control maintenance file card showing various types of punches used

Check for Tightness

Next check all terminals and other current-carrying parts for tightness, and see that all mechanical fastenings are secure. Examine the mechanical operation of the controller parts by hand, particularly observing alignment and closing action of contacts, equality of spring pressure, and indication of excessive wear of hinge pins, contact supports and other moving parts. See that magnet armatures make tight, even contact with the magnet frame or core and that their abutting surfaces are free from grease, dust and rust. Where necessary, sandpaper such surfaces bright. On a-c magnets, check for a broken shading coil or indication of excessive wear of armature and frame faces.

Carefully examine all shunts for breakage of strands, or corrosion due to surrounding atmospheric conditions. Also see that shunts are mounted correctly so that they have maximum amount of available travel and degree of flexing, and that there is no possibility of their coming in contact with any part or object that would result in a ground or short-circuit.

Any shunt having more than one-fourth of its strands broken should be replaced. The same supplies to shunts showing any signs of corrosion failure.

Examine arc chutes for breakage, and see that they do not restrict the movement of the contact either when opening or closing.

Look for discolored metal parts and charred insulation, evidences of excessive heating. Springs, too, may be found to have lost their proper temper due to overheating, and the insulation of magnet coils may show damage from the same cause. Damaged insulation, springs and magnet coils should be replaced.

Inspection of Contacts

In examining contacts, look for excessive burning, deep pitting, or excessive wear. Any of these conditions necessitates replacement of the damaged contacts. Be sure to replace both contacts of a pair, even though only one shows excessive defects, to insure proper current-carrying contact, and see that the new contacts are properly aligned and close squarely.

But do not replace or file contacts that are merely roughened, since such contacts will carry current just as well as smooth contacts. However, if a large projection appears on a contact, it should be removed with a fine file, as shown in Fig. 2.

Copper contacts oxidize slowly at room temperatures, but where the controller operates fairly frequently,

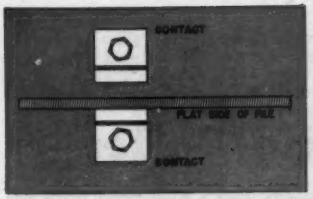


Fig. 2. Large projections on contacts should be removed with flat side of file

the high resistance copper oxide that forms on their surface is removed by the slight abrasion produced by the closing operation. However, where the contacts do operate infrequently, or where elevated temperatures produce an excess of copper oxide, the oxide should be removed with a few strokes of a small fine file.

The oxide on silver contacts should not be removed, and they should never be filed unless they become severely roughened, and then very carefully to avoid damaging them.

Where sulphur gas is present in the atmosphere, a sulphide may form on the surface of silver contacts. Sulphide is darker in color than oxide. If the sulphide interferes with the flow of current, remove it by carefully cleaning with fine sandpaper. Never use emery paper or cloth on any current-carrying surface.

Excessive burning of copper contacts may be caused by the interruption of high currents (contact life decreases approximately as the square of the current interrupted; jogging may cause more than 30 times normal contact wear), requiring the installation of special arc-resisting contacts or a larger controller designed for jogging service.

Another cause is misapplication, if an oil-immersed controller, because, if not essential to the service, replacement with an air-break device can increase contact life 20 to 40 times.

Other causes are high inductive loads, continuous load or sustained overload. In such cases, the installation of silver-faced contacts may be required.

Where the trouble is due to loose connections, insufficient contact pressure, excessive wear, or poor contact adjustment, correction or replacement is necessary.

Welding of contacts may be caused by rapid jogging or by abnormal inrush of currents of more or less than 10 times the continuous rating. The remedy may be reduction of currents or installation of a larger device, or substitution of special nonweld contacts.

Contact pressure in controllers is maintained by wiping springs. If excessive contact wear, or loss of spring temper due to heating, prevents sufficient spring pressure being applied to the contacts, burning of contacts will occur.

The manufacturer's instructions should be followed in making adjustments and replacements of contacts, and testing spring pressure as shown in Fig. 3. In the absence of this information, contacts should be replaced when more than 1/3 of their thickness has worn away, as shown in Fig. 4, and spring pressure should generally be maintained approximately equal on all contacts of a mechanically inter-connected group. If the spring pressure is considerably lower on one contact than on the others, and it is ascertained that all springs are of identical type, the defective spring should be replaced.

Never apply lubricant to contacts, as the burning of oil upon opening of the contacts will increase heating and shorten contact life. Hinge joints and other controller parts should likewise not be lubricated, as lubrication causes collection of dust and gumming of operation. The only exception to this rule is the abutting surfaces of a-c magnet armatures and frames, which should be wiped with a cloth moistened with a good grade of light machine oil, to prevent rust and noise.

If current can safely be applied to the operating circuit of the controller only, it is well to observe its operation. See that the magnet seals completely. This is important in order to exert proper pressure on the contacts. In the case of a-c magnets, failure of the magnet to seal completely will result in excessive current flow through the magnet coil and resultant burnout.

If a controller closes or remains closed when it should be in open position, look for grounds or short-circuits on the operating coil circuit. Failure to open may also be due to welded contacts, misalignment of parts, or gummy deposits.

Automatic controllers should function smoothly and accelerate the load at proper rate. Too rapid acceleration may cause blowing of fuses or excessive line voltage drop; while too slow acceleration may cause motor overheating or burnout of starting resistors.

Various means are used to regulate acceleration: mechanical escapement, air or oil dashpots, timing motors, magnet-operated capacitor relays and decay of flux type relays.

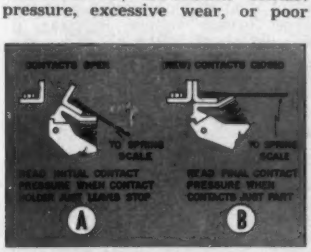


Fig. 3. Testing spring pressures in contacts should be done as described above

Regular inspection of relays on electronic control panel is good practice

Generally, mechanical escapement, dashpots and timing motors can be adjusted or corrected by cleaning, remedying misadjustments, or by replacement of worn or damaged parts. Magnet-operated capacitor and decay of flux type relays, however, require, in addition, reference to the manufacturer's special instruction books. Naturally the current must be switched off before attempting adjustment or servicing of acceleration regulating devices. The actual adjustment of acceleration rate should be made in accordance with the recommendations of the motor or control manufacturer.

Should contact chatter be observed, check for a broken magnet shading coil, poor contact in the con-

(Continued on page 100)

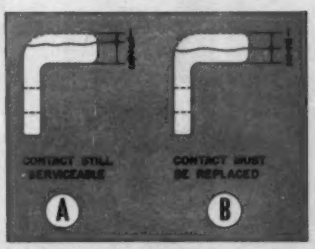


Fig. 4. Contacts should be replaced when more than ⅓ has worn away

FREE:
$15,000 per Year from One Boiler

Devoid of any weasel words, that's what good plant engineering is responsible for at Western Electric's new Shadeland Avenue plant in Indianapolis . . . It would have cost them $30,000 per year to remove rubbish that had to be removed; this has been reduced to $4,000 for ash disposal . . . Installation and operation of incinerator: $15,000 . . . Savings in coal from burning rubbish: $4,000 . . . Net savings on the job: $15,000 annually

By JOHN JAMES CLIFFORD, Mechanical Engineer, Plant Engineering, Western Electric Co.

RESULTING IN SAVINGS estimated at over $1000.00 monthly, the rubbish disposal system at Western Electric's new Indianapolis plant has proved the value of its installation.

Some of the design features of this system might profitably be applied to other plant and municipality disposal facilities. An unusual feature of this incinerator is the inclusion of the boiler to obtain steam from the heat of the burning rubbish.

To Remove Rubbish — $30,000 Yearly

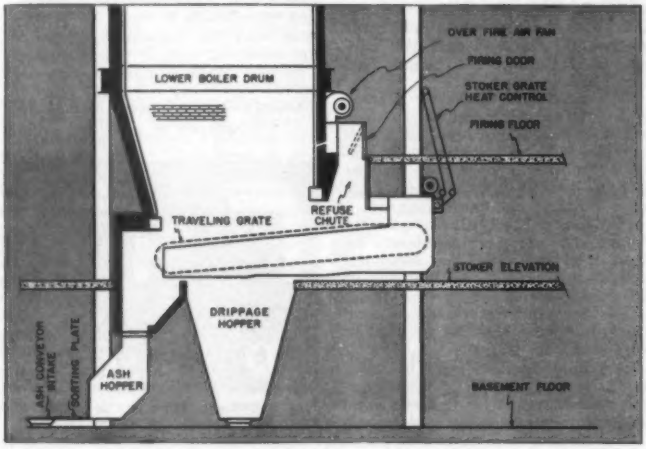
In the early planning for the new plant, rubbish disposal was one of the major problems because of the large-scale production of a product requiring many different kinds of materials and manufacturing operations. There are two ways to dispose of rubbish, burn it or put it on a dump. We chose the burning or incineration method because it was more economical as well as being advantageous to the community.

Investigation of rates for scavengers indicated that it would cost approximately two dollars per cubic yard to remove the rubbish from the plant site. As there was no public dump or incinerator available to us, the scavengers would have had to lease or purchase land for the dumping of this material (this cost is included in the two dollar figure).

Since the estimated quantity of material from this plant was 60 cubic yards per day, it probably would not have been long before the scavenger would have had to acquire new land to dispose of the material. On this basis disposal would have cost the plant approximately $30,000 per year.

With the installation of an incinerator the volume of rubbish would be reduced to 6 cubic yards per day in the form of ash which would cost $4,000 per year for removal. This leaves a difference of $26,000 annually. We estimated the annual cost of an incinerator installation, including investment and operation, to be about $15,000. Incinerators are generally large furnaces, but we decided to install a boiler over the furnace and thereby obtain whatever steam possible from the heat of the burning refuse. With the amount of heat obtained, we estimated to obtain 7000 lb of steam per hour over a 10 hr period each day. This results in a further saving in the form of coal amounting to $4,000 per year. Therefore, we realize a total saving of $15,000 per year by using an incinerator with a boiler over the furnace.

Fig. 1. Firing arrangement of incinerator boiler and arrangement of equipment and floors at the new Shadeland Avenue plant of Western Electric Company



Large Volume Furnace

The boiler, furnace and firing equipment requirements were determined on the basis of burning paper, fibre, lumber and cafeteria refuse. The large amount of bulky material to be burned dictated a furnace of large volume, so a furnace with a volume of 1200 cubic feet was selected. The boiler capacity was set at 15,000 lb per hour at 175 psi operating pressure, on the basis that enough heat would be obtained to generate 7000 lb of steam at an efficiency of 50 per cent (due to the type of material being burned).

After a discussion with furnace designers and builders and boiler manufacturers, we decided to use a package type water tube boiler. This boiler needed some modifications to adapt it to the job. Because of the large furnace volume required, it was set about 7 ft-0 in. above the grate level. The front and rear water walls were then extended down to within 18 in. and 12 in., respectively, of the grate. This served two purposes: 1—the front water wall then gave some protection to the firing slot, and 2—the headers on these walls then formed throats at the front and rear of the grate, giving some control to the depth of the rubbish on the grate.

Side water walls were left in their normal position with a refractory wall below them. The refractory

type side walls made a hot furnace, necessary because of the type and high moisture content of the material being burned. After the boiler and furnace design were decided, we determined the type of grate to be used. A natural chain grate with variable speed and an effective burning area of 60 square feet was selected. This was based principally on experience obtained from the operation of similar installations at other Company locations. The variable speed feature was incorporated to speed up or slow down the grate according to the type of material being burned.

Grate Speed Is Variable

Rubbish is pushed through a self closing firing door and drops through a chute about 4 ft to the grate. This can be seen in Fig. 1. A snow shovel or pusher is used to fire the material into the boiler as shown in Fig. 2. Since the stoker drive and grate are not visible to the fireman, a controller to vary the speed of the grate was installed at the firing elevation. This was mounted on the boiler column to the right of the firing slot and attached to the variable speed drive on the stoker situated below the firing floor. With this controller the fireman can increase or decrease the speed of the grate for different kinds of material being burned—slow speeds for the wet materials and faster speeds for dry materials.

To obtain a more even burning rate and consequently a steadier steam output, the wet material should be mixed with the dry. Steam flow, as evidenced by steam flow charts, is constantly improving as the operator becomes better acquainted with the peculiar characteristics of burning mixed material.

Rubbish Is Hoist-Handled

The material is collected in the main buildings of the plant in janitors' trucks which have a volume of ¾ cubic yards. These trucks are stored in the firing area of the incinerator until it is ready to be fired up. Directly in front of the firing slot is a hoist that lifts the truck off the floor and dumps the rubbish as shown in Fig. 3. The fireman must do a sorting operation at this point, removing as much of the scrap iron, bottles, wire, etc., from the rubbish as possible.

As it is impossible for a man to pick all of those foreign materials out of the rubbish, some naturally finds its way into the furnace and onto the grates. This produces a problem of possible grate link breakage, for these materials work their way between the links and bind them, increasing maintenance and shutdown time. At the front of the chain grate a tripping device with a mercury switch shuts off the grate drive motor if foreign materials are caught in the grate. When this happens, it is necessary for the operator to inspect the grate and remove the interference. The installation of this device has eliminated link breakage.

Fig. 2. Operator firing incinerator boiler with mixture of various types of rubbish

Sorting Plate Provided

The grate travels from the front to the back of the furnace, discharging the ash into the main hopper at the rear and the drippage hopper under the center portion of the grate. These hoppers are connected to the pneumatic ash-conveying system. Once again it is necessary to do some sorting before the ash is put into the conveying system. A sorting plate has been provided between the hopper and the ash conveyor intake, and any nails, bottle caps, pieces of wire, that have come down with the ash are removed before the ash is dumped into the conveying system. This sorting operation prevents plugging of the ash conveyor pipe lines. The soot hoppers under the tube bank of the boiler and dust collector are also connected to the

Fig. 3. Rubbish is handled easily by hoist on monorail. Scrap is collected from strategic locations throughout plant where it is deposited by operators and cleaners

Fig. 4. Piping at front end of drum. Note the dust collector hopper and ash conveyor connection in upper right hand corner. Boiler is package water-tube unit

ash conveyor system. The fly ash collected at these points is put in the same storage silo used for the main boilers in the plant.

The problem of removing ash from an installation such as ours is an important one and should be given considerable thought when the original design is made. The important factor to be considered is the use or disposition of the ash from the plant. If the ash from the main steam generators is to be used for applications that will not permit metallic pieces in it, it is not advisable to include the ash from the incinerator boiler because of metallic pieces that do get through the system. In this case, suitable access should be provided for trucks to get under the hoppers to receive ash from the incinerator boiler.

One operational problem encountered in this furnace is the burning of plastics. Since the boiler was not designed to withstand the high temperatures attained in burning plastic scrap alone, it is now burned in a ratio of one yard of plastic to five yards of other material.

The stoker is equipped with an overfire air fan situated on top of the firing slot as can be seen in Figs. 1, 2 and 3. Nozzles from this fan project through the front water wall of the furnace and supply air for combustion. This fan also keeps the material agitated, thus aiding its combustion. It is manually controlled by the operator; he increases or decreases the amount of air by a slide gate on the intake side of the fan. There is an induced draft fan and dust collector on the boiler. The induced draft fan is large enough to overcome the resistance of the large volumes of gases produced by the burning of this material. The dust collector was installed to prevent the emitting of excessive fly ash through the stack to the area surrounding the plant.

The panel board installed for this boiler, shown in Fig. 3, contains a steam flow meter, both recording and integrating, to keep records of the amount of steam produced; a draft gauge, to indicate pressures in the furnace, boiler and the differential around the dust collector (necessary so the operator would know if any of the passes were becoming clogged due to excessive fly ash from paper and wood); and an outlet damper on the induced draft fan is also controlled from this panel board (this is a manual operation with a button to open or close the outlet damper as different types of material are burned).

Switches for the motor drives on the stoker, overfire air fan and the induced draft fan are also mounted on this panel board. All operations on this boiler are manual, because automatic control is almost impossible with the type of material being burned. The boiler is also equipped with soot blowers to clear the gas passes of excessive fly ash. A steam flow meter is mounted in view of the operator so he can cut down or increase his firing rate to maintain a steadier steam output. A water column with a high and low alarm is also installed in the drum.

The steam produced by this boiler is sent through piping from the drum outlet to the same main steam header as the main boilers of the plant. The orifice for the steam flow meter and the feed water regulator is installed in this line. Therefore, the steam produced by this unit is used for the same heating and process work as the main boilers. When the main boilers are operating at low loads, this incinerator can knock them off the line because of its on-and-off action; therefore, the operators must watch them closely. The feed water supply for this boiler is connected to the same pump and piping that serve the other boilers.

A feed water regulator is used to maintain a constant level of water in the steam drum. The boiler water is treated internally with chemicals which are fed through a pump connected to the steam drum. The same chemicals used on the large steam boilers are also used for the incinerator boiler. Because of the high percentage of condensate return in this plant, the internal treatment system has worked successfully without external water treatment. There are blow-down connections on the lower drum and water wall headers of the boiler which are connected to the main blow-down system from the other steam generators. Some of the piping at the top of the boiler is shown in Fig. 4.

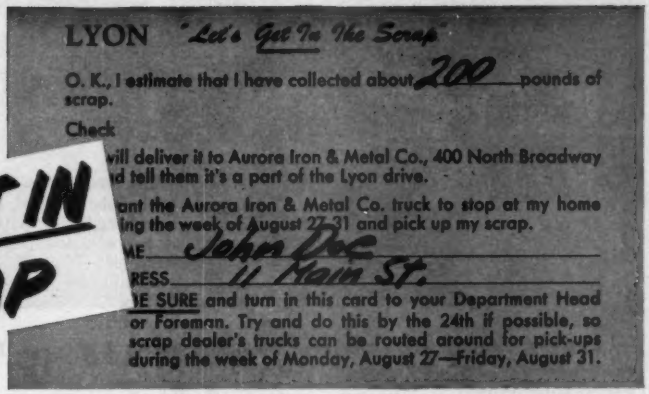
Operation of this system of rubbish disposal has proved the advantages of the installation. It is a much cleaner and more economical way to dispose of rubbish than dumping, and it forestalls a sanitation problem in the community. The additional savings derived by utilizing the furnace heat for generating steam are also important and should be considered by those contemplating the design of a disposal system.

This project has been accomplished through the cooperation of the following: Foster Wheeler Corporation — Boiler; LaClede Stoker Company—Grate; United Conveyor Corporation — Ash System; Hays Corporation—Panel Board.

Lyon Metal's

LET'S GET IN THE SCRAP

Drive Successful



LYON "Let's Get In the Scrap"

O. K., I estimate that I have collected about 200 pounds of scrap.

Check

will deliver it to Aurora Iron & Metal Co., 400 North Broadway
d tell them it's a part of the Lyon drive.

ant the Aurora Iron & Metal Co. truck to stop at my home
ing the week of August 27-31 and pick up my scrap.

ME John Doe

RESS 11 Main St.

E SURE and turn in this card to your Department Head or Foreman. Try and do this by the 24th if possible, so scrap dealer's trucks can be routed around for pick-ups during the week of Monday, August 27—Friday, August 31.

This is pledge card handed out to employees at plant

PUBLICIZING its scrap drive by posters, personal solicitation, newspaper publicity, mailings to employees, Lyon Metal Products, Inc., has put its "Let's Get in the Scrap" campaign over the top. A sound truck was used to further the cause and, at the same time, girls were posted at plant entrances and exits to hand out "pledge" cards.

Payroll inserts called attention to the drive in the one place which was sure to command 100 per cent attention. Top management went all out to make certain that every department head was well briefed on procedure and so conditioned that he was able to impart enthusiasm to other employees.

Results have been more than up to expectations. Over 20 per cent of the Company's employees have so far turned in cards indicating that they have scrap available. The amounts range from a low of 20 lb to a high of 1600 lb. Total figure so far is over 80,000 lb. Scrap was handled by the Company's regular scrap contractor, Aurora Iron & Metal Co., Aurora, Ill.

Right: New bulletins on "Let's Get in the Scrap" drive were periodically posted on the company bulletin board

Left: Crane loading some of the employee-gathered scrap into a scrap dealer's truck. At writing, 80,000 lb had been turned in

How a Blueprint for the Future Helps a Plant to Grow

Operating under three plans, Stockham Valves & Fittings has been able to chart its physical course, coupled with its business progress, with a fair degree of accuracy . . . Three plans account for this success: Plan I — Everyday maintenance; Plan II — Equipment and changes for one year ahead, and Plan III — Alterations and additions for the future . . . Read how this plan works in practice

By **FRED E. VANN**, Plant Engineer, Stockham Valves & Fittings, Birmingham

IN CONSIDERING maintenance, replacement of obsolete and worn out equipment, plant changes and normal growth at Stockham Valves and Fittings, Birmingham, Alabama, work is programmed to conform with a long range view of the plant as it will look several years from now.

Stockham has, actually, three plans, all of which aid in completing the picture of the future plant. These three plans may be called: Plan 1, covering everyday maintenance; Plan 2, listing equipment and changes anticipated for a year, and; Plan 3, the future over-all plan showing alterations, additions and changes for the future years.

The last, or master plan is painted with a wide brush and remains flexible subject to change caused by business conditions, war, and peace. Items on the list are not necessarily in the order of their execution, and it is possible that some items on the master plan 3 will have to be done immediately. For example, in case of a dire national emergency, some building additions, specified in Plan 3, might be constructed immediately to accommodate the production of war material. On the other hand, new developments in casting and machinery processes might obsolete entirely some listed improvement. If such a thing happened, this item would be removed entirely from our planning.

Anything that is to be purchased, constructed, or worked upon in the coming year, that is considered a "capital expenditure," is to be found on Plan 2. This is the one year plan, and nearly everything works toward the goal visualized on Plan 3. Both Plan 2 and 3 deal only with capital items of expenditure.

Maintenance—Plan 1

Maintenance, which is considered as the immediate, or Plan 1, deals with the day to day items handled and built within the organization. Maintenance falls into three categories: immediate, preventive, and progressive maintenance to change or improve operations. Maintenance department equipment includes almost all machinery necessary to handle any kind of job, namely: machine shop, blacksmith, electrical, and motor rewinding. In addition to the physical shops belonging to maintenance, men are assigned to spot locations throughout the plant. The "resident" maintenance men can usually handle most of the equipment failures, but in the case of a major breakdown, a phone call to his foreman can bring assistance from a roving repair gang as needed.

Necessity for long range and immediate plans was clearly evidenced by the World War II emergency. Stockham, like thousands of others, was called upon to manufacture items entirely different from our regular product. In this case, it was forging and machining 75 mm projectiles, hand grenades, land mines, practice bombs. If a master plan had been in existence prior to World War II the additions made to the plant for war purposes could easily have dovetailed into plans for expansion of civilian products.

Further necessity for over-all plans is indicated by the plant's growth since its beginning in 1903 by William H. Stockham, the founder. Starting in an old street car barn 60 by 100 ft, the company moved to its present location in 1918. Since that time, plant facilities have grown from an office and two buildings to its present size of 29 acres with 9½ acres under roof and

Out with the Old

Fig. 1. Part of the brass foundry which is to be moved out

The New Is Already In

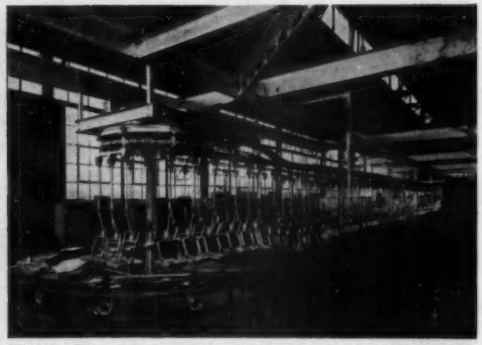


Fig. 2. View of the mechanized malleable casting foundry

Conveyor to Be Replaced

Fig. 3. Castings conveyor being replaced—Plan II for 1951

New One Being Installed

Fig. 4. View of hot castings apron conveyor being installed

are still growing. About 1600 people are employed. Products here have been expanded from manhole covers (later discontinued) to exclusively malleable, grey-iron pipe fittings iron and bronze valves. Other items for the future are already under study.

These products go all over the world to industries, plumbers, ships, oil fields, bringing approximately $15,000,000 to Birmingham and Jefferson County, Alabama.

It is easy to see in an operation of this size that it is absolutely necessary to work toward a planned goal, one that is clearly defined and easy for all to see.

In the last quarter of the year, the master plans are prepared from data accumulated during the year. Typical examples which might be included on Plan 3 are:

—Extension to building based on percentage of pipe fitting business Stockham sells, the trend being projected to determine whether malleable or grey-iron fittings or bronze or other types of valves or fittings may need more space.

—Design or purchase new types of pipe fitting machines.

—Replace the batch-type annealing furnaces with continuous or controlled atmosphere furnaces. (The malleable foundry is highly mechanized so that each operation is performed along a continuous moving conveyor. Right on the end of a continuous operation is a batch-type annealing setup.)

—New sand preparation units for the malleable and grey-iron foundries. Many tons of sand are used daily and mixed with various clays and binders. The size of the operation indicates that only the best, and most rugged equipment should be used. This job will require new mixers, bins, elevators, and conveyors.

Many items move from Plan 3 to Plan 2 as detailed engineering, costs, and time factors indicate that it would be better to proceed immediately than to wait. Naturally, not everything on Plan 2 was first on Plan 3, but everything that becomes a part of Plan 2 must first be completely studied and its approximate cost estimated.

The plant engineering department presents a complete schedule for Plan 2, to cover the following year. Some items may be dropped during study and others picked up from Plan 3. Sometimes it is necessary to trim the over-all expenditure and at other times, it may be advantageous to increase these expenses.

Here are examples from Plan 2:

Replace hot castings apron conveyor on malleable foundry unit; Install two No. 10 balanced blast cupolas; Extend yard crane runway 100 ft; Metal cutting band saw for pattern shop; Build new parking lot near site of services building and restaurant; Construct new Services building for payroll, medical, personnel departments, etc., at new

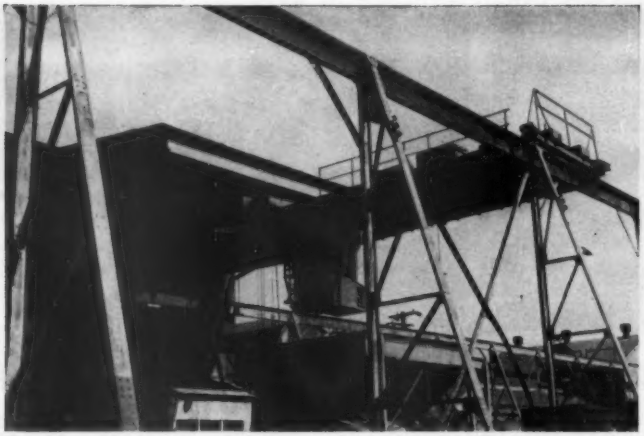
Red Hot Kink — Pumping Molten Zinc

To GALVANIZE or zinc-coat fittings, Stockham Valves and Fittings maintains three galvanizing furnaces, each zinc kettle holding 30 t of molten zinc into which the fittings are dipped.

On several occasions, erosion near the upper lip of the kettle, where the air hits it, has developed a leak spilling 850 deg F zinc over the plant floor. The molten zinc has to be removed immediately to install a new kettle. Dipping out the molten metal was slow and hazardous for the men who had to do it. The zinc had to be put into pig molds and later remelted.

It was decided, because of those difficulties, to try to pump the molten zinc out with a commercial type water pump with a metal hose. The company who makes the pumps was queried, but waited too long answering. On Saturday, they said "it couldn't be done," but on the Friday before, the plant staff had already done it.

Since then the water pump has been used successfully several times to pump the molten zinc either to the other zinc kettles, if not full, or into pig molds. The operation is safer for the men and the zinc is pumped out at about 1500 lb per minute. It takes about 45 minutes to pump out the 30 t.



Crane to Be Bigger and Better

Fig. 5. One phase of Plan II, 1951 calls for the extension of this yard crane 100 ft

location; Construct a new restaurant building at new location. All of the above are completed, or will be, by the end of 1951.

It may be interesting to follow a job after the engineering has been completed and the appropriations for its costs has been approved by the Board of Directors. In most cases, work is being done by the plant construction department from drawings, bills of material and shop orders from the Plant Engineering Department. All material is ordered by Engineering, except concrete, paint, reinforcing rod. At the end of each month a report, prepared by the Accounting Department, is circularized to concerned individuals. This report shows the status of construction, the expenditures to that date, how much remains to be spent, and whether the job is running above or below the estimated cost. In general, it appears that overs and shorts tend to balance out to equal the total expenditure.

While the report is circulated, it is one engineer's job to expedite and keep close check on the status of all work in progress. Each month he checks with the purchasing or the job foreman to see what is holding up the progress of the work. If a certain piece has to be made, equipment is delayed, this man follows it until it becomes ready for installation. In other words, he pries loose the key log in the jam.

Throughout the plant one slogan motivates the work done under Plan 2 or 3, "Get the job done, it's not making a dime in construction!"

A big job that shuts down a whole operation is done during the plant shutdown for two weeks vacation. For instance, the department has ordered the cupolas to arrive for installation during vacation to avoid curtailment of production. The construction group, consisting of about fifty men with two foremen and one superintendent, will take their vacation at some other time.

Maintenance work is handled differently in that there is no written plan such as exists in Plan 2 and 3. It is similar in that work performed must fall within certain expenditures. The Maintenance Department has no budget but charges labor and material against maintenance allowances in the budgets of production departments. In effect, the producing units purchase the services of the maintenance men.

As part of the maintenance program, certain men of the maintenance department are appointed to inspect every piece of equipment at regular intervals. Check-off sheets are usually provided for the purpose. The operators of the machines being inspected work on a bonus system and are quick to report anything that might slow down or stop their own equipment.

Stockham's whole maintenance program is geared toward keeping the equipment running no matter what happens.

Certain of the maintenance men work on changes, improvements, and modifications to existing equipment to make it perform better or require less maintenance. This may be a slight change, or it might mean rebuilding a whole machine.

Many plants are gradually evolving an equipment policy, the implementing of which usually takes a man or group to constantly study plant equipment. Its purpose is to replace machinery when it is economically feasible to do so. Several formulae have been devised to do this mathematically but experience and good judgment are still important. Whether to rebuild, buy a new machine or change the method of doing a certain operation is a problem that sometimes confounds the most astute scholars.

Maintenance Tools

Fig. 6. This gear generator is one of many machine tools used by maintenance to rebuild production equipment

Inspections Continue

At Stockham, after the decision has been made and the new machine installed, engineering does not come to an abrupt halt. A check is made every day on the new machine for its first few weeks to see if it performs satisfactorily. Then the inspections drop off until it has operated about a year, then a careful analysis is made to see if the new machine does what it was supposed to do. Not infrequently, some minor adjustment is necessary to make the new machine operate profitably.

In today's high speed production techniques the difference between a profitable and unprofitable operation often rests on a hair line. On some occasions when the new machine failed to meet its demands, it has been torn out and replaced with something that would meet production requirements. A hard-hearted, purely economic view is definitely in order when assessing the value of plant equipment.

Sometimes it appears more economical to design and build our own tools or machines when standard equipment will not fit our specifications. This is not always from choice in spite of the pride evidenced when you can say "Yes, we designed it, and built it right here in the plant." There are two tool rooms, one in each main machining department, at Stockham and these make most of the tools, jigs, and fixtures used in the plant. The machine shop, under the maintenance department, builds complete machines as designed by the engineering staff.

Analyze Your Piping System

Investigation of heating or process loads in any old plant may lead to interesting disclosures that, for economy's sake, may call for revamping of piping system . . . Here's the story of one job the author worked on where he not only improved performance but eliminated piping runs, heat losses

By WILLIAM W. GAYLORD, Consulting Engineer

PIPING SYSTEMS must be reanalyzed when extensive changes in plant layouts are made; necessary changes in piping systems must be carried out if satisfactory service is to be expected.

An example of what may happen if this is not done came to my attention in a recent check of an industrial plant's heating system. This plant had been expanded to four or five times its original size over a period of sixty years. The power plant in the original layout was adjacent to the larger building but, as additional buildings were put on, the load center moved away from it.

By that time the power plant had been outgrown and a new one was built opposite the new load center but almost 100 ft away from the plant buildings. This power plant was built to heat the plant buildings with exhaust steam from the engine driving the generator. A 6 in. exhaust steam line and a 2½ in. high pressure steam line were run to the buildings. The 6 in. exhaust main was connected into the plant heating main close to the new load center and so gave a good distribution when exhaust steam was used.

However, they did not install a new reducing valve in the power house to supply steam for heating through the 6 in. exhaust main when the engine was not running. Instead, the 2½ in. high pressure line was extended to supply the 2 in. reducing valve that had been used when taking steam from boilers in the old power plant. This worked reasonably well when used only as an auxiliary but it had become uneconomical to operate the engine-driven generator because it could not carry the whole load. So all steam for heating was passed through reducing valve.

It was soon found necessary to block the old 2 in. reducing valve wide open to get enough steam through it to heat the buildings in cold weather. If the buildings were allowed to cool down over a weekend it required several hours to bring them back to a proper temperature.

An investigation of the heating load in the buildings served by this reducing valve showed a design requirement of 4675 lb of steam per hour. There was a 2200 lb per hour demand for process and high pressure heating steam which must also be carried by 2½ in. high pressure line from boiler room. This made a total of 6875 lb per hour.

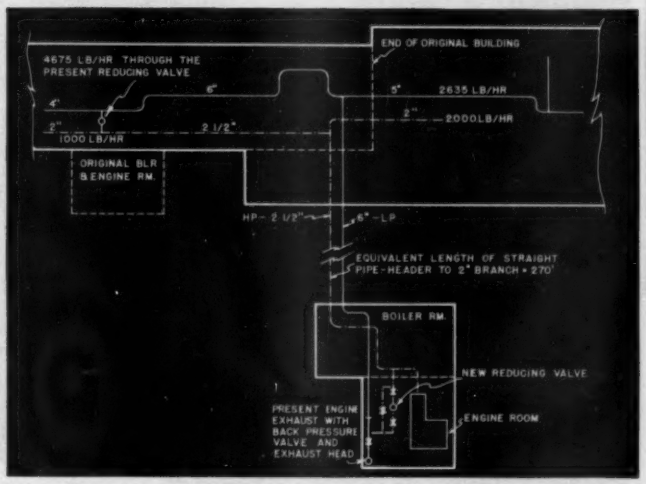
A calculation of the expected pressure drop in this line, with this flow, showed that the pressure at the reducing valve inlet would be less than half the 120 psi carried at the boilers. This pressure drop so reduced the capacity of the reducing valve that it could not pass the required amount of steam except when valve was blocked wide open.

The analysis of this piping system showed that the installation of a new reducing valve, of proper size, in the engine room was the economical move to make. Then it would be possible to supply all low pressure heating steam to the factory buildings through the present 6 in. exhaust steam main.

This would leave the 2½ in. main to supply process and high pressure heating only, and make it possible to reduce the boiler operating pressure to that required to run the fire pumps. This, with a few other simple changes to the heating system piping, would materially improve operation and insure an ample supply of steam to all of the radiation in the heating system with a material saving in fuel.

While the case cited above was somewhat unusual, the analysis of most plant piping systems where successive additions have been made will show that simple changes can be made to integrate and improve the operation of the system. This is especially true of process piping systems where new and improved process equipment has replaced older equipment. A careful analysis often will show that by simple and inexpensive changes, from one-third to one-half of the old process piping can be removed and the supply to the process equipment improved with a material reduction in piping system losses.

Often it is more effective to have the piping survey and analysis made by an outside consultant rather than by the plant personnel, as a different viewpoint may disclose points that would be overlooked by those more familiar with the system who might, because of this familiarity, fail to notice irregularities.



This sketch shows the middle third of a group of buildings in plant that had been growing for sixty years. Piping changes are described in the article

ADDITIVE PLANT LUBRICANTS — How They Help with Lube Problems

I — Viscosity Index Improvers and Oxidation Inhibitors

By T. RICHARD YOUNG, Field Engineer, Foundation for Industrial Research

THE USE OF ADDITIVES in the form of specific chemical compounds in lubricating oil is generally considered to date back about twenty years. At that time oleic acid was used to achieve oiliness property in lubricants, substituting for the animal fats previously used. During the past few years an increasing use of synthetic chemical compounds has occurred to control the properties of lubricants.

In the field of industrial lubrication the following types of additives are now used commonly: Oiliness agents; extreme pressure agents; pour point depressants; viscosity index improvers; oxidation inhibitors; detergents; corrosion inhibitors; anti-foam agents; tackiness agents.

Oil types in which these additives may be incorporated include turbine oils, hydraulic oils, transformer oils, other highly refined circulating system oils; textile, mining, woodworking, and food machinery oils; diesel oils, break-in oils, wet air or gas compressor oils, and other special types. In order to appreciate the utility of lubricant additives it is necessary to have some background on oil types, and final characteristics desired in the oil.

In carrying the original oils through the refining steps several general changes are effected. The asphaltic and highly unstable compounds are first removed. Then the low viscosity index or naphthenic compounds are largely removed in the solvent extraction step. Heavy waxy compounds are removed by dewaxing. Throughout this processing the oxidation resistance of the oil is improved and its demulsibility or ability to separate from water is improved. To some extent oiliness, or ability to lubricate a bearing under abnormal bearing pressures, is reduced. In some respects a loss of rust protective ability also occurs during refining.

The fact that refining can be carried beyond a useful point from a lubrication standpoint is pointed up by the fact that the common medicinal white mineral oil, refined by fuming sulfuric acid to water-white purity, can lubricate the human intestine and little else.

Also, the final oil can be finished to any viscosity index value over a wide range, and similarly the oil can be finished to a pour point over a wide range. Other properties of the fully refined oil which require improvement to meet specific service conditions may be improved with with additives.

To return to viscosity index improvement, the two principal viscosity index improvers are a polybutylene and methyl methacrylate. The availability of V.I. improvers allows the refiner to stop short of maximum V.I. in the refinery, reducing his treating loss. The economic limit for viscosity index improvement in refining is about 50-70 V.I. for naphthenic oils and 95-110 for paraffinic oils. Viscosity index improvers are used in types of oils which require the least change possible in viscosity-temperature relations.

Typical industrial applications are hydraulic oils, gear oils, torque converter oils, and automotive oils. Most of the data on lubricants improved with V.I. additives which has appeared in the literature is concerned with automotive oils. However, the beneficial effect achieved in a high V.I. motor oil shows very well the same benefits that are achieved in industrial oils which are required to operate over a wide temperature range.

The effectiveness of V.I. improvers is shown in Figures 1 and 2 which show the improvement of oils ranging from 40 to 110 V.I. (natural) up to a maximum of 140 V.I. Increasing an 80 V.I. oil to 100 V.I., a typical problem, may be accomplished with less than 2 per cent additive dosage in some cases, as shown.

Figure 3 shows viscosity-temperature curves for oils of V.I. varying from 0 to 130. Note that the graph is a modified semilog grid, and the slight difference in the slopes of the lines are highly significant when the viscosity differences are read at the low temperature region of the lines. The line A-B represents commonly accepted average maximum oil viscosities at which satisfactory engine

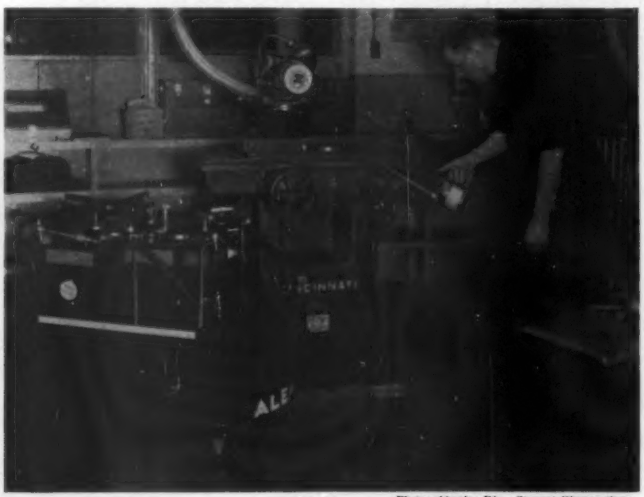


Photo: Alemite Div., Stewart-Warner Corp.

Oiliness agents having ability to lubricate under boundary conditions are used in formulating way lubricants which minimize stick-slip conditions in way action

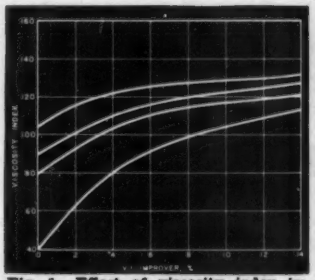


Fig. 1. Effect of viscosity index improver on base oil. Viscosity of base oil is 42 SUS at 210 F. (Data from Bulletin 0-48, Monsanto Chemical Co.)

starting can be obtained. It is seen from the intersection of the three different oil viscosity-temperature lines that the minimum starting temperatures for the oils are as follows: 0 V.I. (—5 F), 75 V.I. (—11 F), and 130 V.I. (—22 F). Note that all three oils are SAE 10 grade oils with the same viscosity, 90 SUS at 130 F. Thus, at normal running temperatures in the engine, all three oils will have the same lubricating value.

The value of high viscosity index at reduced temperature is paralleled by its desirability at elevated temperatures. Notice that in the region 250-300 F, which shows the viscosity of the oil at a temperature that markedly affects oil consumption, the 130 V.I. oil shows about a 10 per cent higher viscosity than the 0 V.I. oil. This means reduced consumption for the high V.I. oil.

Extremely high values of viscosity index: i.e., those in the neighborhood of 150 V.I. can be used for low temperature service. Thus an oil of 155 V.I., will have a viscosity of 3,000 SUS at 0 F compared with an oil of 100 V.I. having a viscosity of 25,000 SUS at 0 F, both oils having the same viscosity at 210 F. Thus the increase from 100 to 155 V.I. represents a reduction of 88 per cent in the viscosity of the lubricant at 0 F and a reduction of 88 per cent in the viscous friction of the bearing.

It has been reported that some additives employed as viscosity index improvers are not fully stable under conditions of high shear, such as occur in hydraulic pumps with close mechanical tolerances and high rate of recirculation of the oil. The viscosity index improvement of the additive can therefore be decreased in an oil by severe conditions of service. Of the two principal types of additives mentioned above, methyl methacrylate gives a higher possible increase in viscosity index than polybutylene, but is less stable under conditions of high shear.

A second major type of additive used for lubricant improvement is the well publicized oxidation inhibitor.

Although the primary use is in oils for continued service at high operating temperatures, as in automotive crankcase and steam turbine service, there are a number of other important applications for this type of additive improvement.

The need for oxidation inhibitors has been increased by, strangely enough, the higher degree of refining used during recent years. Thus the aromatic constituents of lube oils were early recognized as sludge forming constituents, and refining processes, such as acid treating, were soon found to remove them. The remaining types of oil compounds, naphthenic and paraffinic, then showed a greater tendency to oxidize than when they were mixed with the aromatic materials. This has been explained on the basis that among the aromatic constituents removed in acid treating there was a small percentage of natural oxidation inhibitors that helped prevent the paraffinic and naphthenic compounds from oxidizing.

It was found that an acid treated oil, possessing chiefly naphthenic and paraffinic constituents, would usually oxidize to form organic acids. The over-all effect of acid refining has been to reduce the total amount of oxidation and to change the sludge forming characteristics of the oil to a tendency to form acidic oxidation products.

At the present time most oils intended for high temperature service are treated with synthetic oxidation inhibitors. These include automotive oils, steam turbine oils, air compressor oils, and oils subject to oxidizing conditions at low temperatures such as transformer oils, spindle oils, instrument oils, and central system circulating hydraulic oils.

An oil can be exposed to oxidation by exposure to high temperature (crankcase oil), moderate temperature and increased oxygen pressure (air compressor lubricant), by aeration (splash lubricated cylinder wall), or by having an extended surface area for the volume of oil involved, as in some oils used for lubrication of wool during processing. The amount of oxidation which can be tolerated in any given service also varies. The plant engineer does not care particularly what precipitation number or neutralization number his oil may have, but he is interested in mechanical interferences with equipment caused by oil oxidation products such as stuck

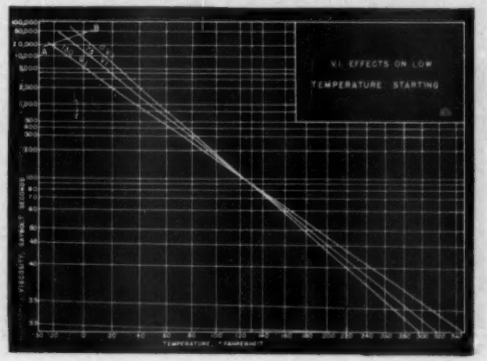


Fig. 3. Viscosity-temperature graph of oils of different viscosity index. (Data, Monsanto Chemical Co.)

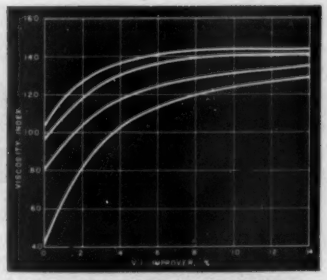


Fig. 2. Effect of viscosity index improver on base oil. Viscosity of base oil in this case is 57 SUS at 210 F. (Data from Monsanto Chemical Co.)

piston rings, sluggish hydraulic valves or corrosion of bearing surfaces from oxidation acids.

Because of these different situations, there is a variety of oxidation inhibitors which may be used in industrial oils. It is possible to compound an oil with an oxidation inhibitor to be effective at high temperatures, at moderate temperatures, or to be effective with particular kinds of oils which do not respond readily to improvement with the more common types of oxidation inhibitors.

Many of the oxidation inhibitors are metallic organic compounds containing barium or calcium. When oils containing such additives are decomposed by heat an inorganic ash is left which upon occasion can be troublesome as on exhaust valves in diesel engines and elsewhere. Where minimum inorganic ash is desired in the decomposition products of the oil, sulfur-phosphorus organic additives which leave no ash are available to the oil compounder.

Dosages of additive depend upon the level of inhibition that is desired. Typically, a premium automotive crankcase oil will contain 1.50-1.75 per cent by volume, a medium duty oil will contain 1.75-2.25 per cent and a heavy duty oil will contain 2.25-2.75 per cent inhibitor.

(Continued on page 104)

A LITTLE JACK Has a Lot of PULL . . . and PUSH

Versatility to the Nth degree is contained in this portable hydraulic jack and its many attachments . . . Construction of the unit—to operate in any position—is part of the secret of its general usefulness around the plant . . . Remote control operation, through a flexible hose, adds safety and the opportunity to use the jacks in confined places . . . Greatest contribution to its versatility is made by many attachments

ONLY TOO SELDOM does a really multi-use mechanism cross the industrial horizon. Tools, perhaps, have a greater representation in this select group than do other mechanisms. One tool in particular, a hydraulic portable jack so constructed that it can operate in any position, would seem to be standing unblushingly in the front line of this group waiting for its good conduct medal.

In this unit the pressure cylinder and plunger are made as one part, with the pumping mechanism and allied parts made as a second part. The former is referred to as the hydraulic ram; the latter is called a hydraulic hand pump. They are connected by a strong flexible hose.

Switching quickly from one ram to another is made possible by means of a quick-disconnect coupler. In places that are hard-to-get-at a lightweight ram may be positioned and the hose attached just before the jacking operation takes place.

The ram is built with an internal spring so the plunger retracts automatically when the release valve is opened. This speeds up operations when the unit is used on repetitive actions.

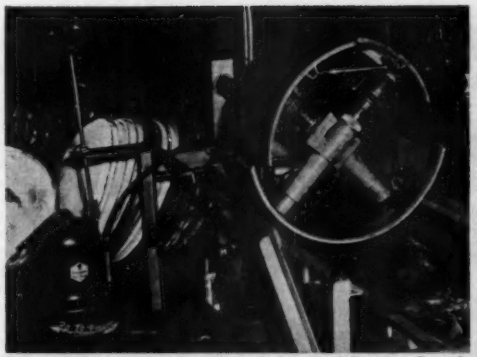
A seeming multitude of attachments are available for the jack; these enable the unit to perform many dozens of different kinds of jobs. With the proper selection of attachments one can do not only lifting jobs, but pulling, pushing, pressing, clamping, spreading, bending and straightening. The ram plunger, ram body and ram base are threaded to receive these standard attachments; representative of these are pusher heads, tube extensions, couplings, spreader toes, pull plates, C-clamps and pusher pins.

The infinite variety of jobs and attachments to perform them is impossible to describe here. The photographs tell a better story.

Readers who want additional information on these units may get it by requesting information on the "Portable Jack." Use the no-postage required cards elsewhere in this issue

Ten-ton unit lifts hoist off rails for maintenance operation

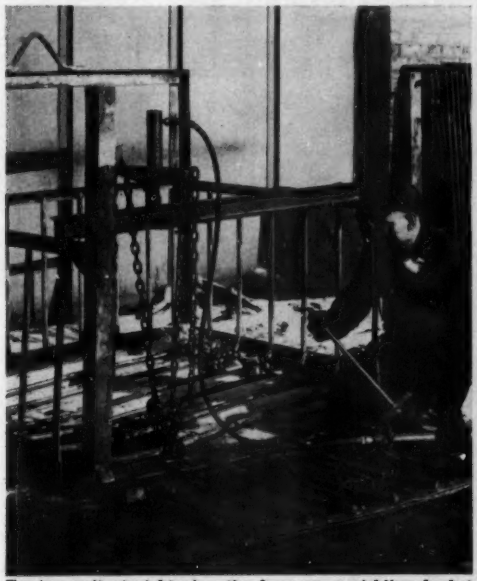
Unit with chain pull plate attachment realigning a post



Two units in special fixture used for straightening barrels

Two-ton unit with toe-lift attachment spreading sticky die

Two fifty-ton portable hydraulic jack units being used to save time in driving a pipe through a hard clay bank



Ten-ton unit straightening the bars on a pickling basket

Two units re-stressing plant floor to give it added strength

News From the Plants

First Crane Runway with a Reverse Curve

A crane runway with a reverse curve, said to be the only one of its kind in the country, has recently been completed by the Lehigh Structural Steel Company and installed at its plant in Allentown, Pa.

Lehigh engineers ran into a problem when a projected straight-line extension to one of its crane runways would have been halted by the pier of a highway bridge.

Extension of the crane runway was needed to enable the company to make maximum use of its yards north of the bridge. Therefore, the engineers designed a crane that would run over a reverse curve that goes around the bridge pier.

Although cranes have been built to travel a curve of one diameter, representatives of Shepard Niles who built the two cranes and hoisting equipment, believe the Lehigh crane to be the first in the United States that will go around a reverse or S-curve.

To travel the 456-ft runway the cranes use two sets of wheels of different diameters on the end of each axle on each truck. The diameter of the larger wheel, which travels on the outside or longer rail, is 1¼ in. larger than the smaller wheel.

The switch from one set of wheels to the other is accomplished by use of separate rails which are 10 in. apart and overlap 3 ft at transfer points. Thus, the smaller wheels come in contact with the inside rails at the beginning of the curve.

Both cranes are 15-ton capacity with 5-ton auxiliary hoists. The cabs are of special design and mounting so as to get clearance under the arch of the bridge and obtain maximum ground clearance.

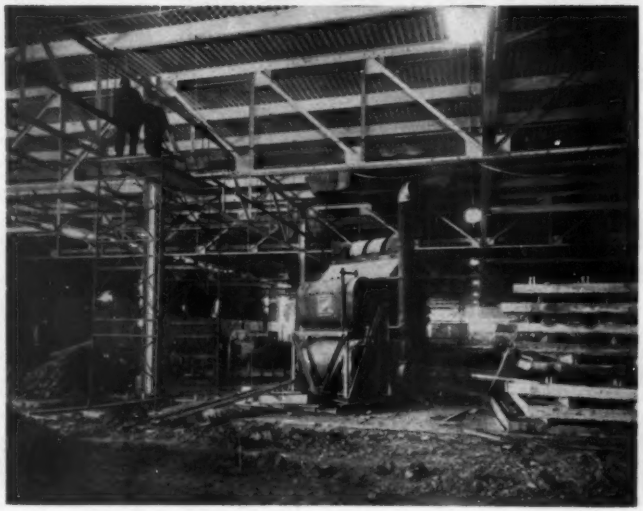
"Temporary" Heaters Increase Construction Production

Use of six "temporary" oil-fired heaters of high capacity permitted uninterrupted inside construction work during the coldest weather last winter on the big new Cleveland, Ohio, engine plant of the Ford Motor Company.

The heaters, standard industrial direct-fired units, were mounted on timber skids so they could be positioned where needed in the construction area. Two 250-gal fuel oil tanks were supported on steel angles built on the skids. With this arrangement, the heaters needed only a 220-v power line for operation.

Besides maintaining comfortable temperatures for workmen constructing the building, the six heaters kept the ground inside from freezing and permitted concrete pouring during freezing weather. The heat also helped cure the concrete.

It is planned to use the heaters for similar temporary heating jobs in the future. Heaters were manufactured by Dravo Corp., Pittsburgh.



Controlled Conditions Control Sprouting

When Utz Potato Chip Co. planned its new plant in Hanover, Pa., a major problem was to provide the correct temperature in potato storage rooms to prevent spoilage. A potato chip producer ordinarily buys a year's supply of potatoes during six weeks in the early fall and stores them for use throughout the year. Spoilage from rotting can result in a serious financial loss, as can sprouting if it is not controlled properly.

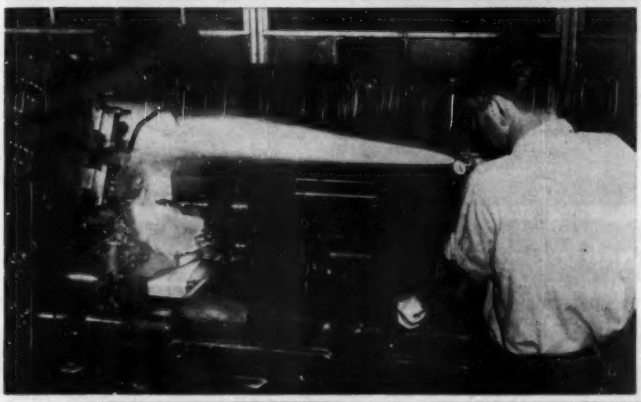
Fortunately, both rotting and sprouting can be controlled by maintaining a uniform cool temperature in the storage rooms. This problem was solved by installing a combination heating and cooling system in this new 120 ft by 220 ft building.

For heating, two cast iron boilers, one oil and the other gas fired, were installed. Each one can carry 75 per cent of the heating load and both together handle 6,000 sq ft of steam radiation through a two-pipe distribution system.

Area heating uses both unit heaters and fin-tube convectors. The convectors are installed in the three storage rooms to avoid high-velocity movement of warm air which induces sprouting. Heating and cooling units in storage rooms are controlled by thermostats to maintain a constant temperature in the range between 35 and 50 F, an ideal ambient for potato storage. The potatoes shown in the photo have sprouted far less than if they had been stored in a variable temperature room.

Thermostats on the unit heaters in the chip process rooms and warehouse are connected into the boiler control circuit through relays. Each thermostat is wired to its unit heater fan motor through a pressure control connected to the condensate side of the heater. When room temperature drops, the thermostat starts the boiler, and when steam pressure rises high enough to trip the pressure relay at a unit heater, its fan starts. National Radiator Company boilers and unit heaters were used.

Controlling Machine Tool Fires with Hand Extinguisher



If pressurized fire extinguisher protection is within easy reach of a machine operator, hazard to machine tools like this Greenlee automatic can be eliminated. This particular screw machine fire, which had gained one minute headway, was extinguished in 1½ seconds when a portable extinguisher was brought into action. The extinguisher is attached directly to the screw machine and can be detached and operated by one hand, leaving one hand free. The extinguisher utilized fast acting CBM (Chlorobromomethane) under 150 psi for this almost instantaneous control of what might have been a costly fire. This new chemical unit has just been approved by Underwriters' Laboratories, Inc. It is made by Stop-Fire, Inc., 125 Ashland Place, Brooklyn 1, N. Y.

$250 Every Day Cleaned Up By Milwaukee Foundry

The replacement of out-moded blast cleaning and dust collecting equipment by a modern rotoblast rocker-barrel, a rotoblast table, and a unit-type dust collector is saving General Foundries of Milwaukee, Wisconsin, more than $250 a day. This modern jobbing foundry cleans miscellaneous gray iron and alloyed iron (semi-steel) castings which are produced for the machinery, automotive, electrical and aircraft industries throughout the midwest. More than $100 a day is saved in direct labor costs, and $150 a day in breakage, according to Edward Gutzkowski, Cleaning Room Foreman.

The equipment to achieve these labor and breakage savings was a 6 ft single type "LK" rotoblast table with a maximum load of 5000 lb, a 17½ cu ft rotoblast rocker-barrel which will clean up to 3000 lb in one load, and a "CK" 6 ft unit-type dust collector.

Machine tools in customers' shops are reported to last longer because of the complete removal of burnt-in sand. The location of the dust-collecting units close to the machines they serve has materially reduced freezing and emptying problems. Manufacturer and installer is Pangborn Corporation.

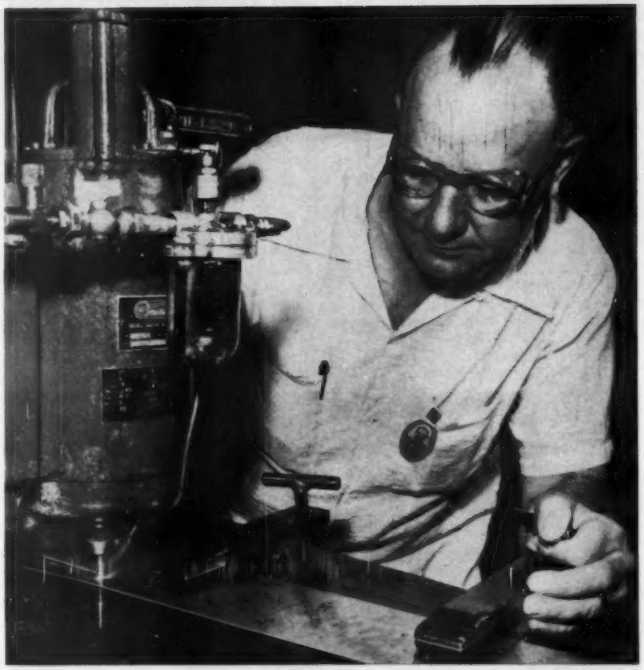
News From the Plants

Oiler Attachment Saves Time, Adds Cutter Life

A pressure oiler attachment for tilt table routers, developed by George W. Holcombe, an employee in the Material Preparation Department of Texas Engineering and Manufacturing Company, Inc., Dallas, Texas, has reduced man-hours in routing operations by approximately 12½ per cent, and at the same time added more than 100 per cent to cutter life before replacement is required.

Other advantages resulting from the use of Mr. Holcombe's device include cleaner cuts on the routed parts and a consequent reduction in the burring time required. The development consists of a one quart oil container, rigidly mounted, which is connected to the router head with a piece of flexible tubing. The container is equipped with an oil adjustment valve. Pressure is supplied by a compressed air line which attaches to an air pressure regulator valve and an automatic cut-off valve which are mounted to the oil container with rigid tubing. Total cost, including materials and labor, to equip a router with the new device is under $35, according to company officials.

Prior to the adoption of Holcombe's development, standard practice was to apply cutting oil with a brush to the work being routed rather than to the cutter.



Powder Washing for Casting Cleaning

Sand encrustations, fins, pads, chaplets or chill nails, and other forms of excess metal can be removed from castings quickly, easily, and economically by means of an oxy-acetylene method recently developed.

The new process, called powder-washing, utilizes a special blowpipe, equipped with external powder-washing attachment. With this apparatus, an iron-rich powder is fed through oxy-acetylene preheat flames into a low-velocity oxygen stream where it burns and produces superheated liquid iron oxide. Heat from the combustion of the powder and from the slag simplifies and speeds the removal of metal and metal-sand mixtures. Wherever the powder-fed flame is directed against a casting, the metal surface is brought quickly to kindling temperature, and then it is oxidized and blown away by the oxygen stream.

After powder-washing, the surfaces of castings are left smooth, clean, and to close tolerance. There is no undercutting, no torn metal.

The washing nozzle, used with the blowpipe, has a large center hole through which the low-velocity oxygen stream is discharged. Around the large hole is a ring of 10 preheat flame ports. The powder is discharged from a flat tube above the nozzle.

A pneumatic dispenser supplies the powder. Compressed air, regulated to 6 psi, carries the powder through a separate hose to the powder attachment mounted on the blowpipe. Other equipment used, such as regulators, accessories, and oxygen and acetylene supply, is the same used with any blowpipe.

The biggest factor in powder-washing technique is manipulation of the blowpipe, since compressed air and oxygen pressures remain the same for almost all jobs. The blowpipe is moved from side to side across the surface of the casting, in oscillations up to approximately 4 in. wide, depending upon the width of the surface being washed. The nozzle face is held about 2½ to 3 in. from the reaction zone, and the oxygen stream is directed against the casting face at a 20- to 35-deg angle. The method was developed by Linde Air Products Co., manufacturers of the FSC-1 Blowpipe.

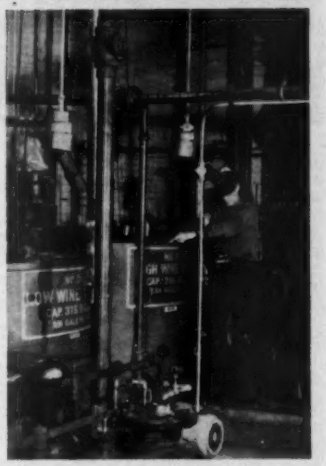
Whiskey Sniffing by Instrument Cuts Accident Rate

"Protect both personnel and property, but personnel first" is the order under which a 27-man Plant Protection Department works round-the-clock at the whiskey distillery of Jos. S. Finch & Co. How effective such a group of men can be when they work with one purpose in mind is attested by the fact that the Finch Distillery has one of the best accident frequency and severity records in the entire distilling industry. Its standing as regards fires and explosions also is a most favorable one.

Since construction and maintenance work in a modern distillery is always in progress, welding at some point or other is an almost continuous operation, with many of the jobs necessarily being done in dangerous areas. It is in these locations that the utmost precautions are taken to prevent explosions and/or fires. Before welding, or other "hot jobs" can be started, it is necessary to secure permission from the captain of the plant police. A plant guard is assigned to the work area to make tests for alcohol vapors and to inspect for the presence of combustible materials.

Only when the plant guard has found, from his Explosimeter tests, that the atmosphere is clear of explosive vapors is permission granted to weld, either electrically or by use of a torch. The guard's word is final and the other employees respect it since they know he is trained for his job and uses reliable equipment. The guard remains with the welder until the job is finished. He has necessary fire extinguishing equipment with him for emergency use. In addition he makes further Explosimeter tests at frequent intervals. When the job is completed the area is subjected to further tests.

The instrument, known as the MSA Explosimeter, is manufactured by Mine Safety Appliances Company, Pittsburgh, Pa.



Maintenance Costs Lowered When Lights are Lowered

Outdoor disconnecting and lowering lighting fixture hangers are effecting savings at the Ivanhoe Road, Cleveland, Ohio plant of The Perfection Stove Co. These fixture hangers are being utilized on floodlights lighting the entire parking lot, all drives, and building walkways. Climbing ladders to service these lights which are more than 25 ft above ground level is made hazardous by the presence of automobiles and high fences surrounding the parking area.

The Perfection Stove Company installation utilizes standard two-pole outdoor hangers incorporating deep canopies which protect the lighting fixture and its connections from the weather. The individual light poles employ from three to six hangers, each of which is controlled independently from ground level and can be lowered for servicing.

While exact figures on savings effected through the utilization of these disconnecting-lowering hangers are not available, Perfection Stove officials state that their use has reduced considerably the time, cost, and hazard of lamp maintenance. The hangers are manufactured by The Thompson Electric Co., Cleveland 14, Ohio.

Takes Tools to Work — Not Work to the Tools

Use of small, electric tools for drilling, tapping, nut-running, pipe and pipe plug driving, and screwdriving in production and assembly of oil changers has cut labor costs 72.7 per cent for Tuxco Corp. of Chicago, effecting a saving of $126,400 on the 1950 output of this product. Use of the same tools in manufacture of tire solution pumps saved an additional $58,500 for the year.

Power-driven hand tools are commonplace on production lines for assembly of component parts, but Tuxco also uses them to replace drill presses, tapping machines and other large fixed machine tools. The tremendous time saving effected has been primarily a reduction in materials handling.

The movement of the odd-shaped castings from machine to machine and the setup on each machine was found to be most time-consuming. Each set of heavy castings had to be moved no less than 28 times.

It was then decided to take the tools to the castings, instead of carrying castings to the tools. This eliminated 80 per cent of the initial basic equipment and performed all of its functions with small, multi-purpose electric tools. Labor time per unit was cut from 11 hours to just 3 hours, a saving of 72.7 per cent.

With labor at $2.00 per man-hour, the unit labor cost was reduced from $22.00 to $6.00, a saving of $16.00 per unit. Since 1950 production was 7,900 units, the saving totaled an impressive $126,400.00. Tools used are Impactools, manufactured by Ingersoll-Rand Co.

News From the Plants

Truck Doesn't Ride On Elevator, Load Does

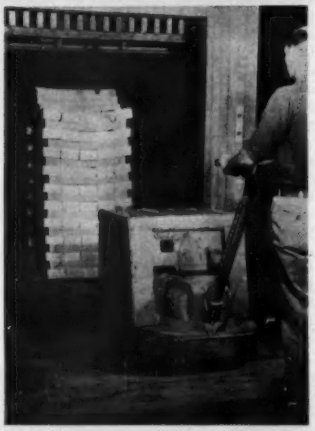
Paperboard stock is transported quickly and efficiently between manufacturing stations in the two-story Lancaster and Lititz, Pennsylvania plants of the Simplex Paper Box Corporation, manufacturer of folding and set-up boxes, by a recently-installed material handling system built around low-lift platform trucks, light-duty elevators.

Horizontal handling of in-process paperboard, in rolls and sheets, between manufacturing stations, at printing presses, cutters and creasers, and automatic folding machines, is accomplished with the trucks.

Vertical handling of these materials between floors is accomplished on recently-installed freight elevators of the self-supporting type. These 2500-lb capacity elevators carry skid loads weighing a ton or more between basement and second-floor levels in both plants. Because the cars are signaled by pressing floor-landing buttons, no one need ride with the loads.

Because the weight of the power trucks never rests upon the elevator platform, these light-duty elevators can handle safely the 2000-lb skid loads. The combined weight of each truck and its load is sustained entirely by the floor sill—the elevator supports only the weight of the skid and its load of in-process paperboard or finished products.

The Simplex management asserts that this truck-elevator system permits a two-floor operation that is faster and more efficient than single-floor operation with its long hauls between manufacturing departments and shipping-receiving points. The elevators are built by Otis Elevator Co., the trucks by Yale & Towne.



Bridge Popping Stopped with Colloidal Graphite

Disturbing noises caused by the friction of expanding joints on the famous Blue Water Bridge between Port Huron, Michigan, and Sarnia, Ontario, presented a problem that defied ordinary means of lubrication. According to Walter Stinson, Secretary of the Bridge Commission in Port Huron, the loud popping sounds prompted considerable alarm and many complaints from people who thought the bridge was falling apart.

To solve the problem the Bridge Commission applied grease to the joints. It did not give the required lubrication and the noises continued.

In Mr. Stinson's words, "We then decided to try a mixture of colloidal graphite and a penetrating oil. This was applied to the expansion joints. The colloidal graphite adheres to the metal surfaces and acts as a dry film lubricant. I am happy to say that the noises have stopped." The graphite used was "dag" No. 2404, made by Acheson Colloids Corp., Port Huron, Mich.

Power Brushes Help Give Citizens a Close Shave

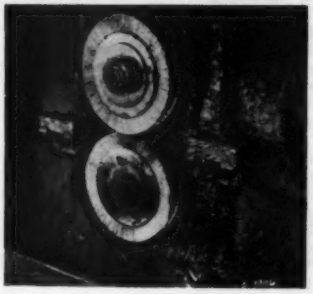
By combining two individual production processes into one automatic brushing operation, manufacturers of cutting tools are saving hundreds of dollars, in addition, are obtaining higher quality finishes.

The two jobs done by the power brushes are: removing heat treat scale, and preparing the strip surface for name etching.

These two operations were formerly done by machines having six brushing heads. However, the use of brushes, and improvements in hardening techniques have enabled the manufacturer to reduce to a two station automatic machine that does both operations simultaneously.

The cutting tool strip is pulled through the brushes at 50 ft per minute. The brushes rotate at 3450 rpm. As they become grooved from wear, they are reversed. Bevel gears move the brushes up or down as required.

The power brush manufacturer's brushing specialists were called in by this manufacturer when the former method of doing this job proved costly. Osborn Manufacturing Co., Cleveland, Ohio, makes the brushes and also made the study.



Economical delivery of large tonnages over short or long distances—from one operation to another if need be (see photo above)—that's the function of the Jeffrey Belt Conveyor. You can depend on Jeffrey Belt Idlers to carry the load. They are built to take severe punishment year after year—roller or ball-bearing troughing or return types. A Jeffrey-engineered material handling system means the best in mechanical efficiency—the best method of doing your particular job, providing economy and long life in the equipment recommended. May we be of service to you?

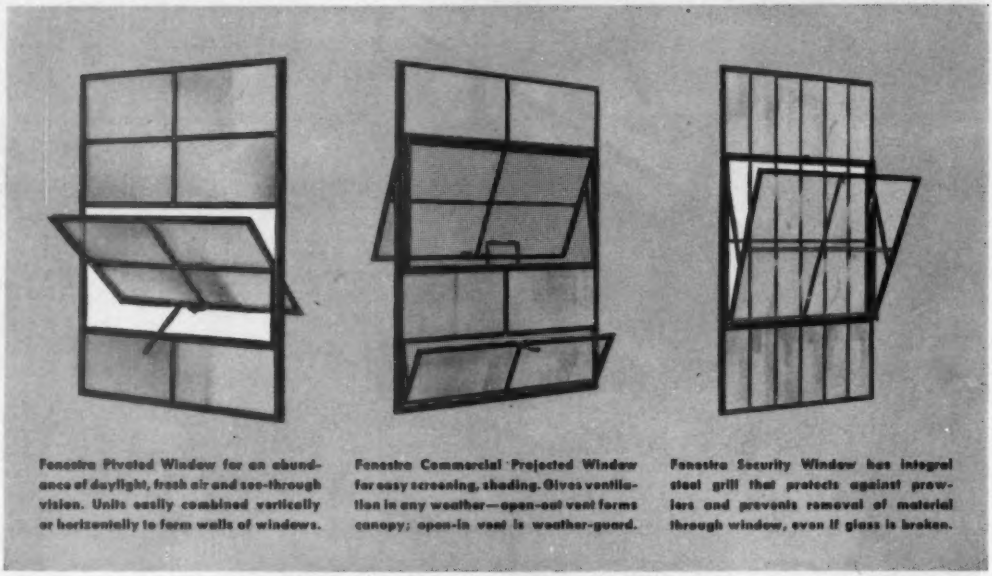
A LOOK AT THESE MAY HELP: **Bin Valves • Bucket Elevators • Chains • Conveyors • Coolers • Car Pullers Crushers • Dryers • Feeders • Idlers (Belt) • Pulverizers • Screens • Packers • Sprockets • Weigh-Feeders Transmission Machinery • • • • *LITERATURE ON REQUEST***

JEFFREY

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

Why These New Super-Galvanized Steel Windows Will Save You Hundreds of Dollars!



Fenestra Pivoted Window for an abundance of daylight, fresh air and see-through vision. Units easily combined vertically or horizontally to form walls of windows.

Fenestra Commercial Projected Window for easy screening, shading. Gives ventilation in any weather—open-out vent forms canopy; open-in vent is weather-guard.

Fenestra Security Window has integral steel grill that protects against prowlers and prevents removal of material through window, even if glass is broken.

You never need to paint them.

They're strong because they are *steel;* they are weather-durable because they're zinc-coat protected.

They will cut your window maintenance to a minimum. So your investment in Fenestra* Hot-Dip Galvanized Steel Windows will pay off year after year for the life of your building.

What makes Fenestra Galvanizing "Super-Galvanizing"? A special plant and a special galvanizing system and special controls..

Fenestra's new plant is the only one in America especially designed and geared to hot-dip galvanize Steel Windows.

Here's what happens:

Once frames are assembled and vents are put together, automatic controls take over . . . moving them along . . . timing every move. From degreasing to pickling to hot and cold rinsing to fluxing and drying go the frames and their vents. Then when finally they are perfect for galvanizing, they dip deep into molten zinc. Then they are Bonderized. Then rinsed again. And with every segment of surface covered by locked-on galvanizing, they go to final assembly of vents in frames . . . then to you.

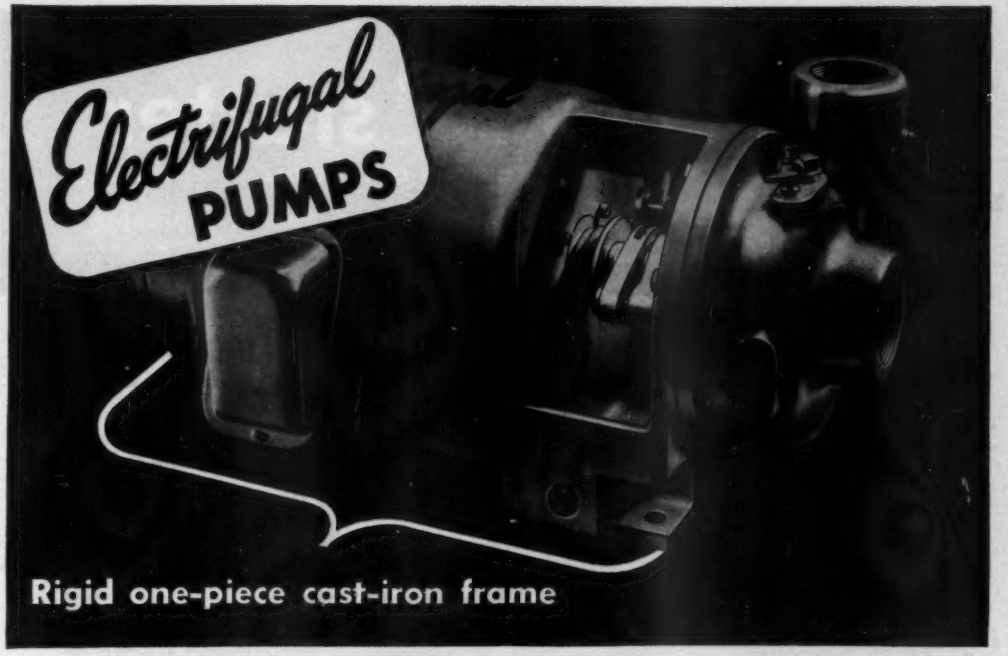
See them today. Call the Fenestra Representative (He's listed under "Fenestra Building Products Company" in your Yellow Phone Book) or write Detroit Steel Products Co., Dept. PE-11, 2280 East Grand Boulevard, Detroit 11, Michigan. *®

Fenestra

Send for your free book on how Fenestra Super Hot-Dip Galvanizing makes Fenestra Steel Windows stay new.

WINDOWS • DOORS • PANELS

engineered to cut the waste out of building



This is the difference between close-coupled pumps

THIS EXCLUSIVE FRAME DESIGN combines maximum space for packing maintenance with exceptional rigidity in a way that no pump assembled to a standard motor can do. Solid cast iron frame with no joints from motor end housing to pump casing assures permanent alignment.

Bearings are lubricated at the factory and should require no attention for years. The stuffing box carries plenty of packing and all parts are generously proportioned for heavy duty service. Wearing rings and shaft sleeves protect casing and shaft from wear and are easily replaced at low cost when worn. As a result, you will find exceptional freedom from high maintenance costs.

Unit Responsibility Means Dependability

Motor and pump are designed for each other and made in the same plant. You have one responsible source for both... one guarantee of satisfaction. Every Allis-Chalmers pump representative is a competent application engineer who will help you select exactly the right pump for your needs. And 94 Allis-Chalmers Certified Service Shops provide nation-wide factory approved service.

Talk over your pump selection problems with your Allis-Chalmers Authorized Dealer or Sales Representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 52B6140.

A-3337

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

Electrifugal, Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

The "preferred" starter

among contractors, electricians, and maintenance engineers

Available for motors up to 300 hp, 220v; 600 hp, 440-550-600v; in enclosures for any service.

Why?

- It's so easy to install
- It's so simple
- It's so trouble free
- It's so dependable

BULLETIN 709 Solenoid Starter

The world's simplest and most popular magnetic across-the-line starter

The dominant position of Allen-Bradley solenoid motor controls among electrical contractors, machinery builders, plant engineers, electricians, and maintenance engineers has been revealed in repeated market surveys. These strong preferences . . . for Allen-Bradley starters . . . are due primarily to the four unique design features tabulated on this page.

Allen-Bradley starters rank first, year after year, because the simplicity in design is a self-evident guarantee of trouble free operation and long life. Write, today, for the Allen-Bradley Handy Catalog.

Allen-Bradley Co., 1317 S. First St., Milwaukee 4, Wisconsin.

1 Easy to install

Because of ample wiring space, and plenty of knockouts. All terminals conveniently accessible. The white interior "illuminates" the mechanism in dark locations.

2 Only one moving part

So simple—because trouble making parts have been reduced to a minimum. No pins, no pivots, no bearings, no linkages to corrode and stick.

3 No contact maintenance

So trouble free—because the double break, silver alloy contacts never need filing, cleaning, or dressing. Install Allen-Bradley starters—and forget them.

4 Full line of enclosures

Allen-Bradley starters can be supplied in the types of enclosures necessary for full protection from dust, fumes, moisture . . . the correct enclosure assures dependable operation.

A-B Quality

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Whitney Chain Drives Simplify Design—Cut Costs

No matter what your drive problem, be it small movie cameras, machine tools or earth movers, you will find a Whitney Chain Drive to fill the application exactly.

And what's more, these adaptable drives offer opportunities for important cost reductions and improved performance. *For example* — Whitney Chain Drives operate equally well on long or short centers. They will drive single or multiple shafts, provide accurate timing or reversal of direction. Standard attachments, built into the chain, offer still more opportunities for economical application possibilities.

And remember, Whitney Chains . . . *the all-steel drives* . . . deliver *full rated* power, smoothly and dependably. Their positive grip transmits constant, uniform speed. They are easily and quickly installed, reducing costly down time. No removal of shafts or bearings necessary. Alloy steel construction assures maximum service with minimum maintenance.

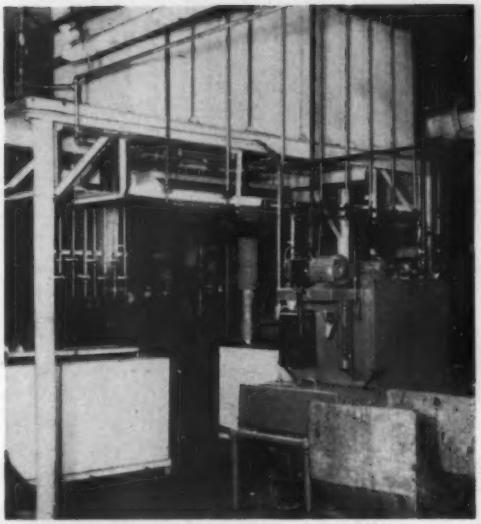
WHITNEY ENGINEERING SERVICE — In addition to the service facilities of more than 130 Distributors, Whitney maintains a network of 15 Field Engineering Offices, located throughout the country. From the complete line of Roller, Silent and Conveyor chains, Whitney engineers can recommend the proper type of drive for your application . . . the chain drive which will give you the best service at lowest cost. Consult your nearest Whitney field office or write us direct for catalog and complete information.

WHITNEY CHAIN COMPANY

232 Hamilton Street, Hartford 2, Connecticut

Plangineering

Planning, ingenuity and engineering are responsible for the successful completion of many projects. Here are just a few results of such planning:



• **Lube Purification Center**—The Cudahy Bros., Inc., has set up a flexible batch treatment center, at its Wis. plant for purifying a variety of lubricating oils. The arrangement of the lube purification center is highly flexible. The same motor-driven transfer pump can be used to move oil into the three dirty oil tanks, lower left, from the dirty oil tanks to the Hilco purifier, from the purifier to the eight clean oil tanks, above, or directly from barrels to clean oil tanks

• **Rubber Crossing**—This rubber railroad crossing, like rubber highways and playgrounds, makes use of rubber as a substitute for part of the aggregate usually used in the asphalt. Goodyear rubber experts believe the resiliency of the rubber-asphalt mix will correct a long troublesome problem—railroad crossing deterioration. This is caused by the terrific pounding and loosening of paving material around the rails by passing trains, and the battering and tearing action at right angles to the tracks by industrial trucks and cars

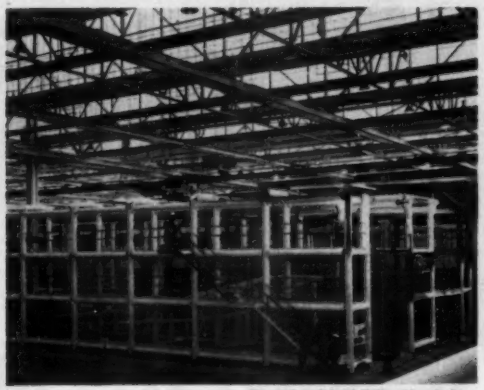
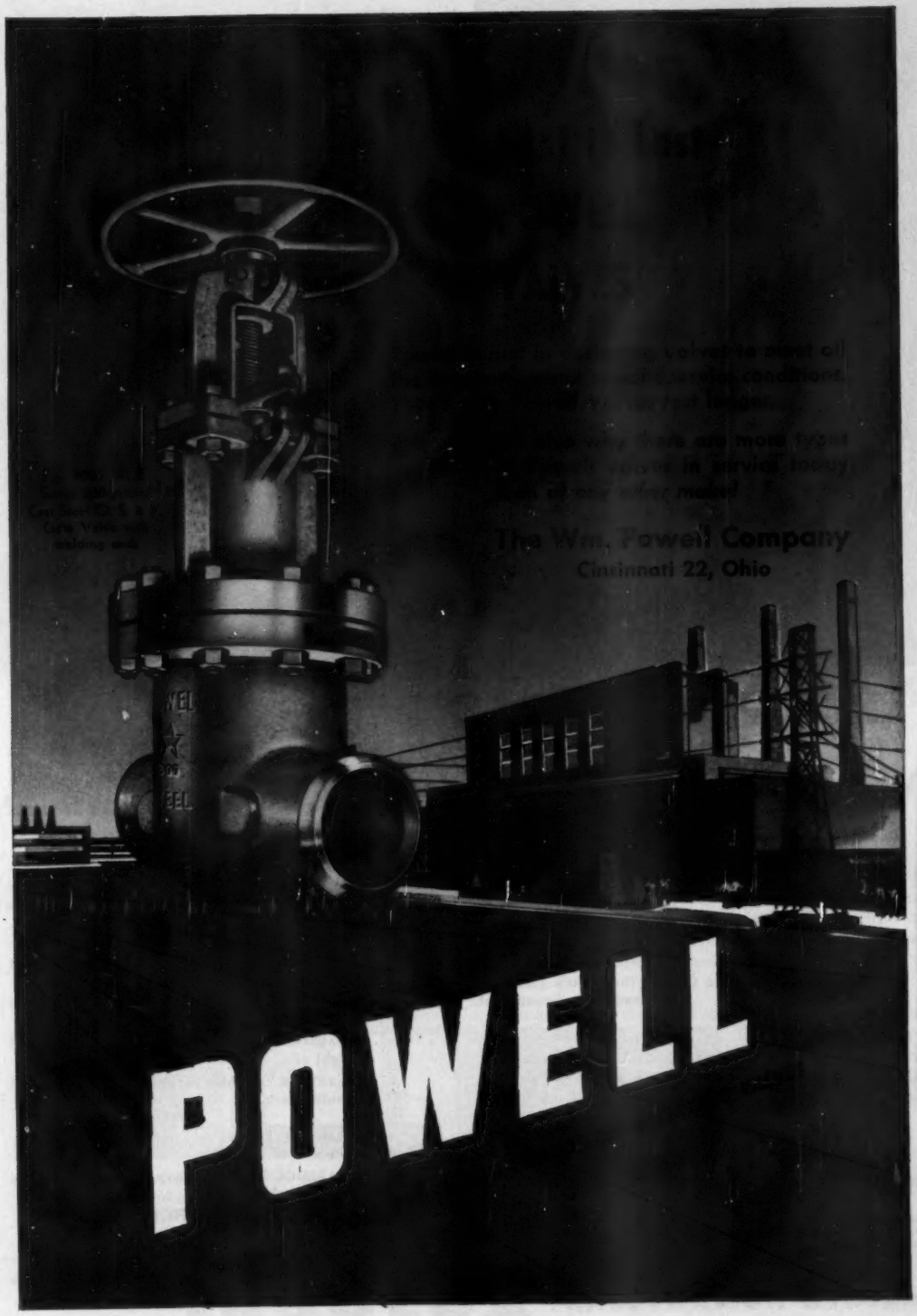


Photo: Consolidated Vultee Aircraft Corp.

• **Indoor "Drydock"**—This steel indoor drydock for simultaneous construction of two giant Navy R3Y-1 turboprop flying boat hulls is nearing completion at San Diego plant of Consolidated Vultee Aircraft Corp. This twin-hull buck structure is fully demountable and can be disassembled, moved to another location and reassembled in a few days. Three main working levels are provided, with a fourth story for the tail assembly area. Overhead monorails are installed along the tops of the deep hull wells, so that completed hulls can be transported from the buck to beaching cradles

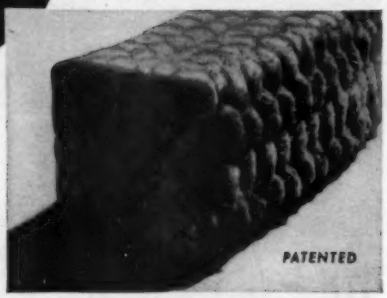
• **Unloading Dolly**—The PLANgineering thinking cap went to work at Tinnerman when their engineers devised this unloading dolly. A compressed air cylinder was installed under the dolly to lift it into vertical position and retract it by means of a cam track. An arbor, installed in the center of the dolly, also operates by compressed air. After the rewind reel is filled, the dolly is moved into vertical position. The slit coils are then stripped from the rewind arbor by an air-operated stipper. The dolly is then returned to the horizontal position and the arbor on the dolly retracted automatically. Coil bundle is then pushed onto the conveyor

Photo: Tinnerman Products, Inc.


The Wm. Powell Company
Cincinnati 22, Ohio
POWELL

Today you need a packing that lasts longer

HERE IT IS



Now, when you must meet tight production schedules, you'll need GARLOCK *Lattice-Braid* to help you avoid frequent shut-downs for re-packing—for *Lattice-Braid* is designed for long, continuous service.

All the strands of *Lattice-Braid* packing are lattice-linked together into a structural unit which holds together, even when the packing is worn far beyond the limits of wear of ordinary braided packings.

GARLOCK *Lattice-Braid* is supplied in several styles listed at the right. Write for folder today.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK *Lattice-Braid* PACKING

ASBESTOS

GARLOCK 730-for hot or cold water at medium to high pressures.

GARLOCK 731-for steam, gases or water at temperatures up to 700°F.

GARLOCK 732 (wire inserted)-for heavy duty service against steam, oil, gases or water at temperatures up to 700°F.

GARLOCK 733-for hot or cold water or alcohol at medium or low pressures.

GARLOCK 734-for cold gasoline, kerosene and light oils.

GARLOCK 736 (blue asbestos)-for concentrated mineral acids.

FLAX

GARLOCK 740-for cold water at medium or low pressures.

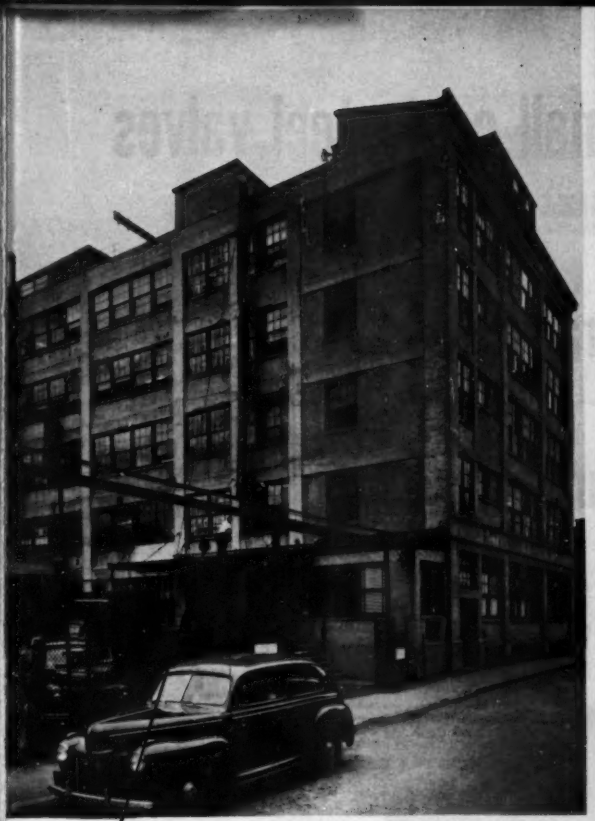
GARLOCK 745-for heavy hydraulic service against cold water.

COTTON

GARLOCK 751-for hot or cold water.

TEFLON

GARLOCK 5733-for all acids, all alkali solutions and all organic solvents.



One of Polaroid Corporation's buildings in Cambridge, Mass., before old, deteriorated sash and windows were replaced with an Insulux Fenestration System.

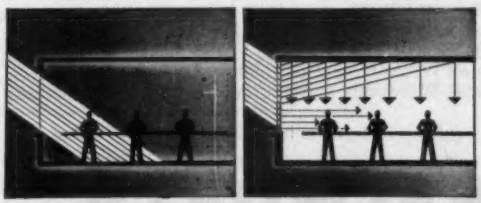
Polaroid Corporation building, Cambridge, Mass., after sash replacement with Insulux Fenestration based on Daylight Engineering principles. Contractor: W. F. Cannon Company, Boston, Mass.

BEFORE Daylight Engineering

AFTER BEING Daylight Engineered

YOU GAIN in many ways when you install an Insulux Fenestration System based on Daylight Engineering principles.

Look at the pictures above. Same building, same basic design. But what an improvement! The handsome walls of Insulux glass block also provide thermal insulation equivalent to 8 inches of brick. Outside noise is silenced. The installation is permanent because Insulux glass blocks neither rust nor rot, and are extremely difficult to break. Maintenance costs dwindle.



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

More than that, the new Number 363 light-directing Insulux glass block pick up rays of light, morning, noon and afternoon, direct them to the ceiling where they are evenly reflected to working areas. It is just as though the building turned with the sun. Employees benefit from good seeing, feel less fatigue.

Find out what Daylight Engineering can do for your buildings. Just write the Daylight Engineering Laboratory, Dept. P.E. 11, Box 1035, Toledo 1, Ohio. Insulux Division, American Structural Products Company, subsidiary of Owens-Illinois Glass Co.

INSULUX GLASS BLOCK

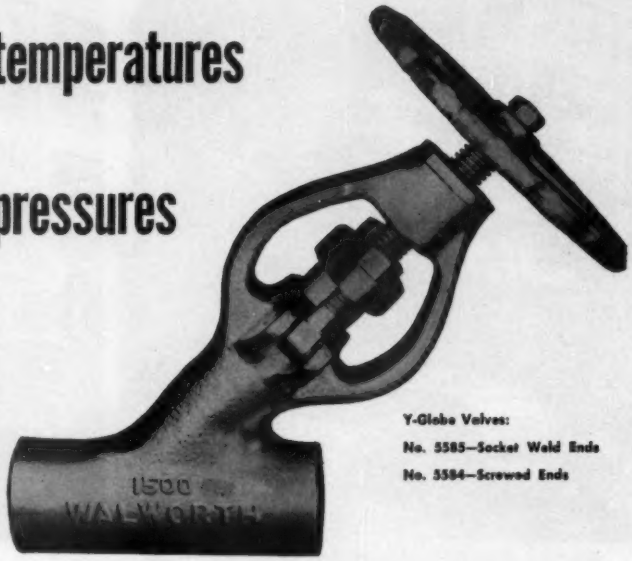
INSULUX FENESTRATION SYSTEMS

—by the leaders of Daylight Engineering

Walworth's NEW small cast steel valves

SERIES 1500 – SIZES ¼ to 2 inches

handle HIGH temperatures
HIGH pressures



Y-Globe Valves:
No. 3585—Socket Weld Ends
No. 3584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.

Angle Valves:
No. 3587—Socket Weld End
No. 3586—Screwed End

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE — made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

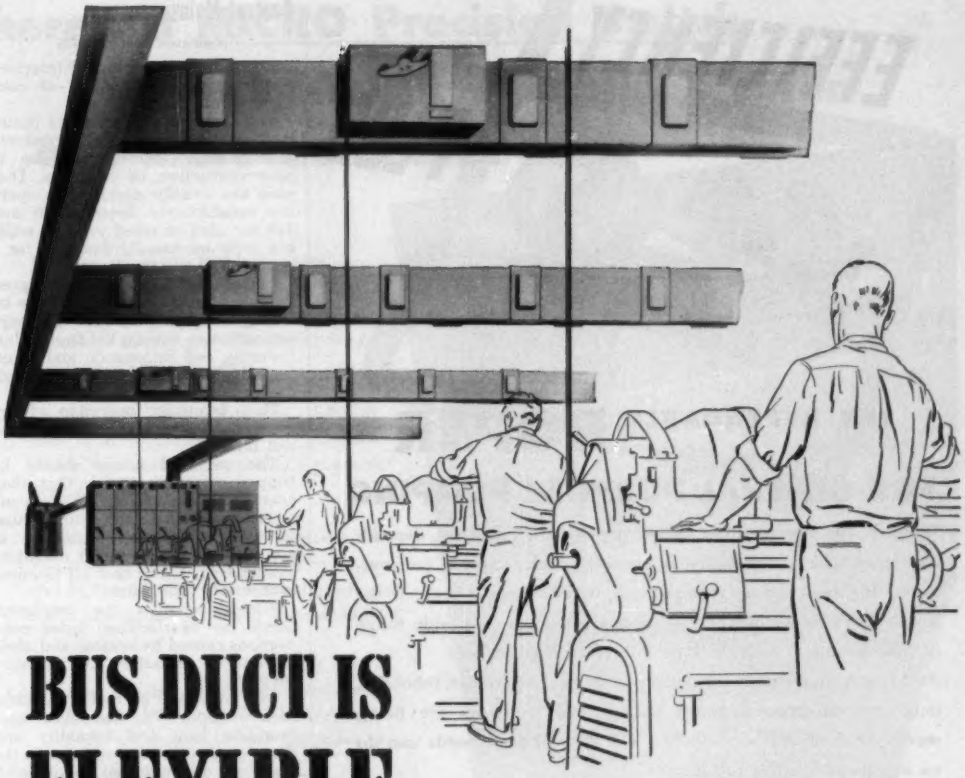
These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



BUS DUCT IS FLEXIBLE

from transformers to machines

Westinghouse Bus Duct can help you provide better power distribution and lick rising cost curves three ways:

First, Westinghouse Plug-in Duct distributes power more dependably to points of consumption—handles momentary overloads safely with minimum power loss, without breakdown. Prestite® insulators completely insulate plug-in stabs, eliminate hazards of accidental contact with busbars. Foot for foot Westinghouse Bus Duct delivers more power than same-rated systems of wireway or conduit.

Second, Westinghouse Bus Duct is installed quickly and easily, minimizing outage time, labor time. Completely prefabricated sections are convenient to handle and mount; cantilever hangers are easy to align.

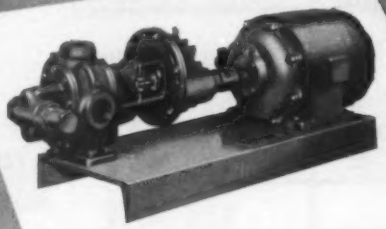
Third, for convenience in installing or relocating machinery quickly, Westinghouse Bus Duct is equipped with plug-in receptacles every foot—no laborious, costly cutting and splicing of cable. To relocate duct itself, simply dismantle and remount sections—minimum loss of operating time, no waste of equipment.

Call your Westinghouse representative for help on power distribution problems, or write for Bus Duct Manual B-4272-A, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-30058

YOU CAN BE SURE... IF IT'S Westinghouse

BUS DUCT

EFFICIENCY + PLUS



THE DEPENDABLE **ROPER**

FOR GENERAL PURPOSE PUMPING

What do you expect of the pumps you install? Efficiency, dependability, endurance, simplicity, an unusually high record of performance? If these are your requirements, by all means investigate the Roper 3600 Series; pumps that are engineered to do a wide range of jobs handling both thick or thin clean liquids.

At this very moment the interests of tank truck operators, refineries, bulk stations, process plants and general industries are being served by thousands of Ropers. The size for your needs can do an equally productive job for you!

OUTSTANDING FEATURES...OUTSTANDING PERFORMANCE

Pumping liquids from A to Z calls for quality-made components accurately assembled. Series 3600 pumps feature hardened helical pumping gears; heavy duty, high-lead bronze bearings; adjustable relief valve (from 20 to 90 P.S.I.); split packing gland; one-piece case of practical design. Standard or special fitted models available. Pressures to 60 P.S.I. — capacities 40 to 300 G.P.M.

Send Today For
"HOW TO SOLVE PUMPING PROBLEMS"
FREE ON REQUEST

SEE OUR CATALOG IN SWEET'S

ROPER *Rotary Pumps*

GEO. D. ROPER CORP.
151 Blackhawk Park Ave.
ROCKFORD, ILLINOIS

Control Maintenance

(Continued from page 73)

trol circuit, or opening of interlock contacts due to vibration or contactor slamming.

Should magnet coil failure occur, it is well to check for excessively high voltage, overheating due to poor ventilation, or vibration. D-C coils are usually designed to operate satisfactorily between 80 and 110 per cent of rated voltage, while a-c coils are usually designed for a range of 85 to 110 per cent.

Lower than minimum designed voltage can cause a-c coil failure by failing to completely seal the magnet armature against the frame, thus lowering coil impedance and causing a higher flow of current through the coil.

Too frequent operation (very rapid jogging) can also cause a-c coil failure.

The overload relays should be tripped manually to see that they operate freely and open their contacts readily. Also check to see that the overload heater rating is in accord with the load and operating characteristics, and that all terminal connections are tight.

Where resistors are employed, check for overheating, loose connections caused by heating and cooling and by vibration, and damaged supports.

Also note, and correct if possible, such conditions as excessive surrounding heat and humidity and dusty or abrasive atmosphere. In the case of oil-immersed equipment, check the oil level, the sealing gaskets, and examine the oil for moisture and sludge. Gaskets should also be examined on dust-tight and watertight equipment.

At less frequent intervals, depending upon service conditions, control devices such as push buttons, master switches, drum controllers, rheostats, limit, knife, float, flow or pressure switches, and speed limiting or governor switches should be examined and tested and any defects corrected.

Also check fuse ferrules and clips for corrosion, and polish with fine sandpaper if necessary. Correct inadequate clip pressure if found.

Manual and drum controller contacts should be kept smooth with sandpaper, or a fine file if necessary. Keep the contact surfaces clean and slightly lubricated with a very thin film of vaseline applied with a cloth. Also lubricate the bearings of such controllers.

Contact pressure should be sufficient to prevent arcing. On drum controllers, see that the star wheel lever spring has sufficient pressure to aid in centering the contact.

Operators of manual controllers should be instructed in the correct way to start motors, so that they won't accelerate them too rapidly, or stop at mid-point and cause over-

There's a MICRO Precision Switch to make YOUR operations safer and more automatic

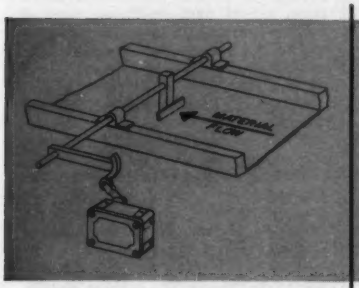
It's easy to apply MICRO precision switches to your present equipment. They are available in a wide variety of housings, mountings and actuators that permit quick and convenient installation.

On this page we illustrate three different uses of three different MICRO products which have resulted in making equipment safer and more automatic.

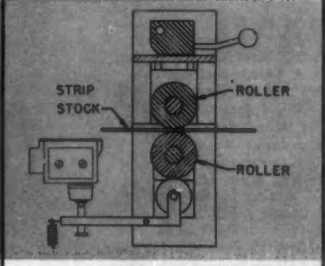
There are MICRO precision switches that will make your old equipment more productive by the addition of a new automatic control, a new safety limit or a new warning signal.

Look in your classified telephone book for your MICRO SWITCH Distributor. They are located in over 120 cities to serve you.

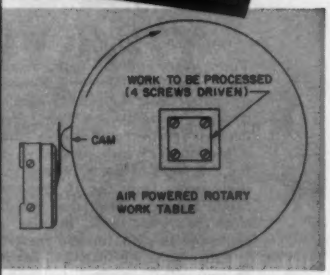
Here's the smallest heavy duty explosion-proof switch you can buy
EXPLOSION PROOF SWITCH
MICRO SWITCH FREEPORT, ILL. U.S.A.
MS
KEEP COVER ON TIGHT. DISCONNECT FROM SUPPLY CIRCUIT BEFORE REMOVING COVER
MICRO Explosion-Proof Switches are Underwriters' Laboratories approved for use in such explosive atmospheres as are found in paint, varnish, starch, and chemical factories, flour mills and oil refineries.



To prevent overloading a belt conveyor feeding a bucket elevator, a paddle was set at the maximum material depth on the conveyor. Overloading the belt moves the paddle and trips the MICRO Explosion-Proof Switch, stopping conveyor motor and sounding alarm.



Variations in the thickness of stock in this rim rolling machine, if too great, will depress the lower roller. This actuates the MICRO sealed-type switch which shuts off the motor, preventing damage to rolls, shaft or bearings.



Leaf-actuated MICRO precision switch is actuated by cam on air-powered rotary work table so as to break the current and stop the table at the exact "home" position before the next cycle is started.

MICRO MS SWITCH

FREEPORT, ILLINOIS

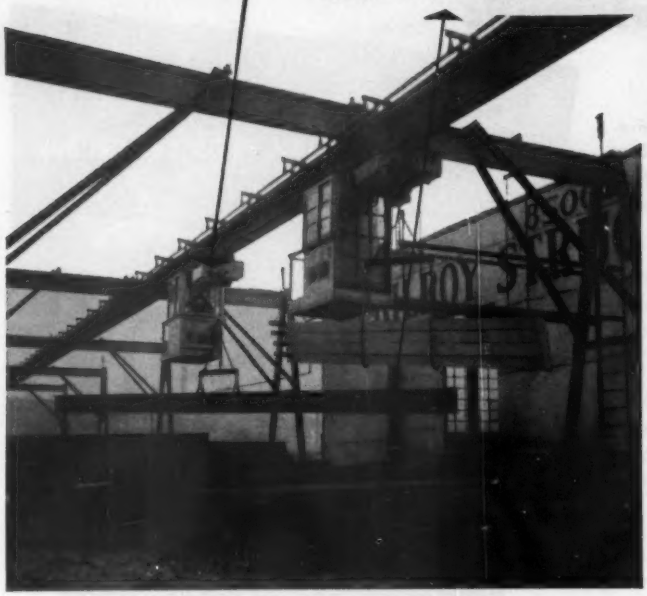
HONEYWELL

What is a new plant idea worth? *Read "MICRO TIPS"*

"MICRO TIPS" is a real gold mine of ideas on how to make plant equipment more productive. Send for your copy today. You'll be glad you did.

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

one good crane led to another



R&M airlift handles up to 125 tons/day for Kilroy Structural Steel

Three years ago the Kilroy Structural Steel Co., Cleveland, Ohio, installed a five-ton Robbins & Myers enclosed cab traveling crane to handle raw steel and prefabricated components in their storage yard. When they needed another crane—they simply repeat ordered "R&M."

Moving 125 tons of steel is an ordinary day's work for this team of R&M cranes. In one recent three day period, with assists from the 16 two-ton R&M hoists in use inside Kilroy's plant, they handled a total of 400 tons of steel from raw stock, through fabrication and onto transport headed for the customer!

Kilroy's service manager, Mr. McGreal, reports that in spite of rugged all weather use their R&M equipment stays on the job with only routine maintenance. This team adds up to low cost, fast and efficient steel handling for Kilroy Steel. Even if your biggest load never tops 500 lbs., it will pay you to consult your nearby R&M representative. He has full details on this and hundreds of other cost reducing, time saving hoist and crane applications—plus the knowledge to apply them to your problem.

Write for Bulletin No. P111E.

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

heating of the starting resistors.

When checking electronic control equipment for resistance welding, first have the power-supply and control voltage disconnected but the water supply turned on. Then check for leaks, kinks in hose connections, operation of mechanical-type water flow switch, and flow of water upward through power tubes.

Next remove tubes and remove any dust from socket tops. Replace the tubes and see that all connections are tight. Also see that all relays are in de-energized position.

Then inspect adjustable resistors for good contact between the slider brushes and the resistor windings, and see that the knobs are tight. Also check ignitor fuses for correct capacity.

Next, apply control voltage only and then, following the manufacturer's instructions, check for correct time interval in cathode heater timing. During cathode heating time delay the thyratrons should not glow except for small grid-current glow in trailing control tubes and firing tubes. The firing-tube-anode protective relay should not respond to water flow. Where a thermal type flow switch is employed, see that correct voltage is applied to heating element.

After the cathode heating time, the thyratron for rectified d-c supply should glow, and the firing-tube-anode protective relay should respond to operation of the water-flow switch. Do not touch the metal power tubes. All hot-cathode tubes should show evidence of heating, and the inside surface of glass tubes should be free of condensed mercury, except near the lower part of the glass bulb. If mercury adheres to the glass walls in the upper part of the bulb, improper ventilation or air leak in the tube is indicated.

In most cases, operation of the control timing circuits may be inspected without applying power to the welder and by observing anode-current glow in the thyratron tubes. During operation, the thyratrons should have a deep blue glow. Presence of foreign gas is indicated if they have a green or blue glow.

Check the dial settings, switch positions, etc., of the control adjustments.

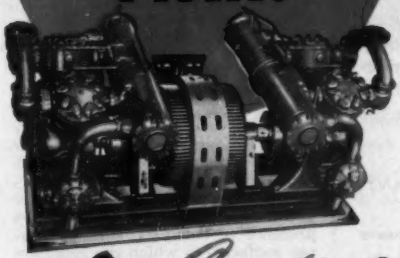
Now apply the control voltage, power-supply voltage, and water, and make test welds on scrap metal. During operation both firing tubes should have somewhat uniform flicker. Flaring of firing tubes indicates hard-starting ignitrons or insufficient load current for starting ignitrons. Make sure that the power-tube load current is sufficient for starting ignitrons (40 amp reactive load or 25 amp resistive load).

For safety, remove all power from the control circuit and welder before replacing tubes, connecting in meters, or doing any work on the control.

Get TROUBLE-FREE AIR-POWER at ROCK-BOTTOM COST!

JOY Series 100 compressors are available in two and four cylinder models and in single and twin units. Capacities from 378 to 3656 c.f.m.

UP TO 3656 C. F. M. in a TWIN!



with a JOY PACKAGE TYPE

HEAVY DUTY WN-114 COMPRESSOR

Install it, start it,—then forget it! That's what you can do with a JOY compressed-air power unit, because it's built to give constant, dependable service 24 hours a day, year in and year out. JOY Series 100 Air Compressors are two-stage, double-acting, heavy duty, continuous service compressors—much smaller than old style compressors of the same capacity, yet with operating economies exceeding those of the older, bulkier units. JOY *pioneered* the compact, modern, "package-type" compressor.

All wearing parts are replaceable on the Series 100—the finest air compressors you can put on the job. ● *Let us give you full details on the size that fits your air-power requirements.*

Consult a Joy Engineer

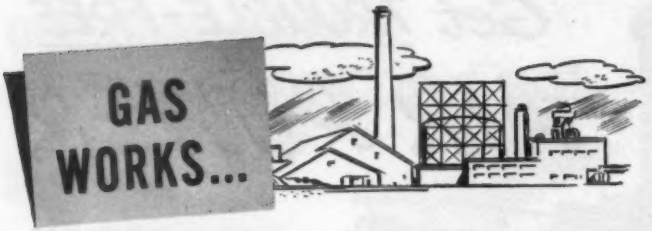
100 Years of Engineering Leadership

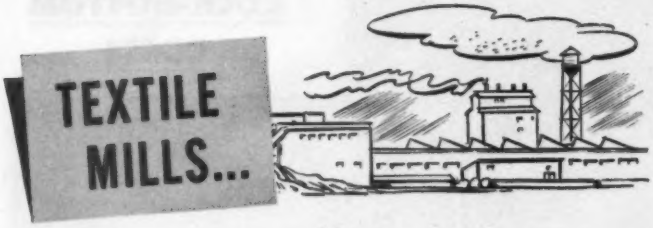
WAD I 3913

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO





CHECK CORROSION FROM ACIDS AND ALKALIES LONGER WITH

Gas works . . . constantly exposed to corrosive fumes as well as weather, find the protection of rubber-base paints an important contribution to lower maintenance costs. Similarly, the textile industry uses rubber-base paints extensively because these paints resist acids and alkalies alike—help protect metal and concrete surfaces as well as equipment.

Continuing tests indicate that rubber-base paints will resist common causes of corrosion three to four times longer than ordinary protective coatings. Exceptionally satisfactory service results are obtained in numerous industries where surfaces are attacked by acids, alkalies, and salts.

Rubber-base paints dry fast and are easy to apply. They are especially durable on concrete because they resist abrasion and the free alkali in cements. Ask your paint supplier for details or write:

HERCULES POWDER COMPANY
INCORPORATED
Cellulose Products Department
966 Market Street, Wilmington, Delaware

RUBBER-BASE (PARLON)® PAINTS

CR51-3

Additives

(Continued from page 83)

Under some circumstances the same inhibitor may be used in both high and low temperature service, as in railroad diesel lubricants and in torque converter fluids. Usually the lower temperature service will require a lower dosage of the additive, as for example, 2-4 per cent in diesel service and 1.7-3.0 per cent in torque converter oil.

Oxidation inhibitors are used normally in the base oils which have been refined previously to a high degree. However, oxidation inhibitors are effective in either solvent refined oils or in conventionally refined oils.

Low temperature range oxidation inhibitors are used in turbine, hydraulic, transformer and other highly refined industrial oils, also in some types of light bodied perservative oils.

There are differences, as mentioned above, in the types of oxidation products that are produced as different types of base oils oxidize in service. Naphthenic oils tend to produce sludge, whereas paraffinic oils produce alcohols, ketones and organic acids including formic and acetic acids which are corrosive to common metals of construction.

The plant engineer may, with experience, develop sufficient data on the rate of deterioration of his circulating system oils, such as those in hydraulic systems, to determine a maximum life period for an oil batch. Common laboratory tests to follow the deterioration of an oil in service include the increases in viscosity, naphtha insolubles, and carbon residue. If a chemical laboratory is available in the plant, the engineer would do well to develop a program of periodic testing of his system oils so that he obtains maximum service from them.

The selection of an oxidation inhibitor for use in a lubricant is complicated by such factors as deterioration of the inhibitor under some conditions of service, much in the same manner that the viscosity index improvers discussed previously may be destroyed by high shear conditions imposed on the lubricant.

Some common oxidation inhibitors which protect a base oil or grease may be ineffective in the presence of catalysts, such as copper surfaces, to which the lubricant may be exposed. For copper containing systems it is desirable to have an oil with an inhibitor which will be effective in the presence of the copper surface.

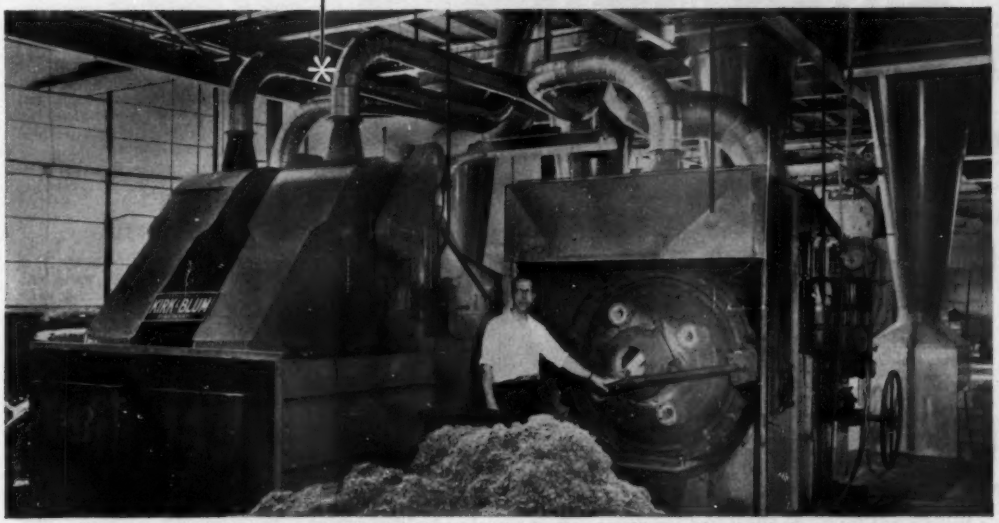
Special additives are used for stabilizing pale oils against color change in storage. These are usually metal deactivators, compounds which deactivate or coat the surface of metal containers in which the oil is held, thus reducing their catalytic effect on the oil and preserving the quality and appearance of the oil.

KIRK AND BLUM DUST CONTROL SYSTEM

Safeguards Workers

Saves Valuable By-products

....PAYS FOR ITSELF!



* One of two tilting reduction furnaces. Babbit trimmings are melted down, separated from steel parts and other foreign matter.

In the reclamation of costly automotive babbit alloy in a reduction furnace, toxic fumes and lead oxide dust are formed. The lead oxide dust is as valuable as it is hazardous. KIRK & BLUM was called on to solve this problem.

For each of two reduction furnaces (one shown in photos) a complete enclosure was provided. No dust or fumes can escape to the room. The enclosure is exhausted to a battery of four KIRK & BLUM high efficiency centrifugal collectors which separate the lead oxide dust. Four to five hundred pounds of this valuable by-product are reclaimed each week. From a "safety" and also a "salvage" view point the efficient system has proved a fine investment, which will pay for itself in a short time.

Air handling problems solved by the Kirk & Blum organization cover every phase of industry. Further examples are illustrated and described in a catalog, "Fan Systems for Various Industries." Copy on request.

KIRK AND BLUM

DUST CONTROL SYSTEMS

THE KIRK & BLUM MFG. CO.
3189 Forrer Street Cincinnati 9, Ohio

for SAFE, SURE SERVICE SPECIFY CHIKSAN

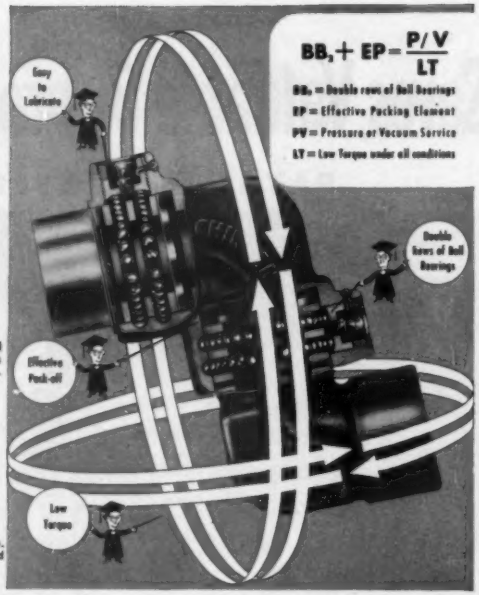
Standard Swivel Joints. For pressures from 125 psi. to 15,000 psi.

High Temperature Swivel Joints. For temperatures to 500°F. M.W.P. 700 psi.

Rotating Joints. For 150-lb. steam, brine, etc. Adapted for siphon return line.

Sanitary Swivel Joints. For Food Processing, Dairies, Bottlers, etc.

Hydraulic Swivel Joints. For pressures to 3,000 psi.


BB, + EP = P/V / LT
BB, = Double rows of Ball Bearings
EP = Effective Packing Element
PV = Pressure or Vacuum Service
LT = Low Torque under all conditions
Easy to Lubricate
Double rows of Ball Bearings
Effective Pack-off
Low Torque

For over a quarter-century, here at CHIKSAN, we have specialized *exclusively* on developing and designing Swivel Joints* for all purposes . . . on manufacturing them to our rigid standards of precision . . . and on following through in the field to check performance under all sorts of conditions. That's why there is no substitute for CHIKSAN *Ball-Bearing* Swivel Joints* when it comes to efficient service with maximum safety . . . longest life . . . and minimum maintenance.

It costs you nothing to take full advantage of CHIKSAN's *specialized* experience. CHIKSAN Engineers will gladly cooperate with you in designing flexible lines to meet your specific requirements.

WRITE FOR CATALOG NO. 50-C. REPRESENTATIVES IN PRINCIPAL CITIES—SOLD BY LEADING SUPPLY STORES EVERYWHERE

*For full 360° rotation in 1, 2 and 3 planes. Unlimited flexibility in pipe lines is secured merely by arranging swivels in proper sequence. Over 500 different Types, Styles and Sizes for pressures to 15,000 psi; temperatures to 500°F.; pipe sizes from ⅛" to 12" and larger.

CHIKSAN

CHIKSAN COMPANY

AND SUBSIDIARY COMPANIES

Chicago 3, Ill. BREA, CALIFORNIA Newark 2, N. J.

WELL EQUIPMENT MFG. CORP. HOUSTON 1, TEXAS

CHIKSAN EXPORT CO. BREA, CALIFORNIA NEWARK 2, N. J.

BALL-BEARING SWIVEL JOINTS FOR ALL PURPOSES

NEW BOOKS

for the plant engineer

Control Your Quality

QUALITY CONTROL HANDBOOK edited by J. M. Juran. Size 6 by 9 in.; 800 pp. including index; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N.Y. Price $10.00.

THIS MANUAL presents quality control examples from actual cases and records. It is designed primarily for reference and use by executives, supervisors and engineers in industry.

More than half the pages in the book are devoted to the universal principles which apply to the vast variety of products and processes. These include the statistical methods and paperwork in the quality function. The remaining portion of the main text covers the applications of principles to particular products and processes such as screw machine operations, aircraft manufacture and electron tubes.

Salvage Metal Parts With Surface Build-up

METALLIZING HANDBOOK by H. S. Ingham and A. P. Shepard. Fifth edition, size 6 by 8½ in.; illustrated, cloth bound. Published by Metallizing Engineering Co., Inc., Long Island 1, N. Y. Price $3.00.

ALMOST 20 YEARS of experience in the design, manufacturing and use of metallizing equipment has contributed to this handbook. This edition supersedes the one published in 1946 because of the many developments in the field of metallizing since that time.

The book covers various methods of preparation prior to metallizing. The application of metallized coatings for machine element work and for many special production jobs are discussed separately. A section is devoted to engineering data relating to the metallizing process. Ventilation for blasting and metallizing, and safety measures are topics offered to round out the knowledge of this particular process.

A Study of Corrosive Action

CORROSION CAUSES AND PREVENTION by Frank N. Speller. Size 6 by 9 in.; 686 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $10.00.

THIS REVISED third edition is a result of the author's awareness that the knowledge of corrosion and its prevention has been increasing remarkably. Recent findings in the

Don't break feeder insulation or "splice-in" ammeter to take readings. Just "Amprobe" it!

To check motor overloads, starting currents, opens, shorts and voltage, just "Amprobe" it!

To balance loads, locate grounds, check circuit capacity and voltage losses, just "Amprobe" it!

For checking start and running currents, shorts, relay setting, voltages, etc., just "Amprobe" it!

That's why you should 'AMPROBE' it!

$49.50

THE ONLY POCKET-SIZED SNAP-AROUND VOLT-AMMETER

These and many other time-saving, money-making applications have made the Amprobe a "must" tool with electricians in every field. The only snap-around volt-ammeter that fits in your pocket is made for your pocket and priced for your pocket.

Model A-6 (illustrated) measures 0/10/25/50/100/250 amps AC and 0/150/600 volts AC. Other models for specific applications also available. Accuracy is ±3% of full scale. Built for rugged service. Available at better supply houses for only $49.50 complete with belt-mounting carrying case and voltage test probes.

Pyramid Instrument Corp., 49 Howard Street, N. Y. 13, N. Y.

AMPROBE

"SENSITIZER" MODEL A30

Increases Amprobe sensitivity by 10 times. Adds 3 low-current ranges. 0-1; 0-2.5 and 0-5 amps. Also "splits" the line on sealed conductors. Only $4.85

PYRAMID INSTRUMENT CORP. PE-111
49 Howard St., New York 13, N. Y.

FREE! 30 ways to "Amprobe" it and save time and money now described in new booklet "Servicing With the Amprobe". Send for your copy today!

Name_____

Company_____

Address_____

City_____ Zone____ State_____

It's no circus

SERVICING YOUR LIGHTS!

GIRAFFE: I'll report this to the S.P.C.A.! My contract says I'm an entertainer, not an extension ladder!

MAINTENANCE MAN: Now don't get excited! You can go back to the circus after I clean these lights.

Well why the $#©%*¢ don't you install THOMPSON HANGERS? Then you could clean these lights at floor level whenever necessary.

Thompson Hangers? Whadda they do?

They lower overhead lights to floor level for servicing. What's more, they completely eliminate all climbing and electrical hazards and cut maintenance costs to a minimum!

S-a-a-a-a-y, that sounds terrific! Are they complicated . . . hard to operate?

The THOMPSON HANGER is simplicity itself! All up-and-down movement is controlled by a chain or cable that's part of the installation, and the hanger automatically repositions itself when raised. The live electrical contacts stay at the top. It's safe and foolproof!

Where can we get more details on these Thompson Hangers?

Write to The Thompson Electric Co. and ask for CATALOG No. 50. It will give you the complete story. Now slide down, chum, and turn me loose!

In traveling with The Big Top, the giraffe has seen many THOMPSON HANGER installations, and he has learned that in each (1) maintenance costs are down to absolute minimum, (2) lighting service men have top safety records and (3) all lights are operating at peak efficiency to facilitate round-the-clock production operations.

Write today for your copy of CATALOG No. 50. There's no obligation.

CATALOG No. 50 describes THOMPSON HANGERS and accessory items in detail

272-TR

1. DISCONNECT 2. LOWER 3. SERVICE 4. REPOSITION 5. REPEAT

THE THOMPSON ELECTRIC CO.

1165 Power Avenue • Cleveland 14, Ohio

field have been incorporated in the revisions and additions to the book. The written material has particular reference to ferrous metals.

The comprehensive text is divided into two parts. The first section presents the general principles, such as the influencing factors, testing and mechanics of corrosion. The other section deals with preventive measures for different types of corrosion —for example: corrosion peculiar to steam generating equipment; stray current corrosion, and others.

Pertinent data on the calculation of corrosive rates, conversion tables, tests for corrosive activity, alloy analysis and a glossary of terms are given in the appendix.

Eliminate Vibration Worries

VIBRATION AND SHOCK ISOLATION by Charles E. Crede. Size 6 by 9 in.; 328 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $6.50.

HERE IS A practical reference book on the principles of isolation, the design of isolaters (shock mounts) and their application to protect equipment and machinery from vibration.

Isolation is treated from the analytical viewpoint which mathematically-inclined engineers will find interesting and from the descriptive viewpoint which other engineers will find useful.

The material is well arranged. In the front of the book is a notation of all symbols used and an introductory discussion on the mathematical and physical concepts used later. From this point there is a logical progression from elementary to complex isolation systems, to materials for isolators and finally, applications of the previously developed basic theory.

Specifications and Standards On Mineral Wool Insulation

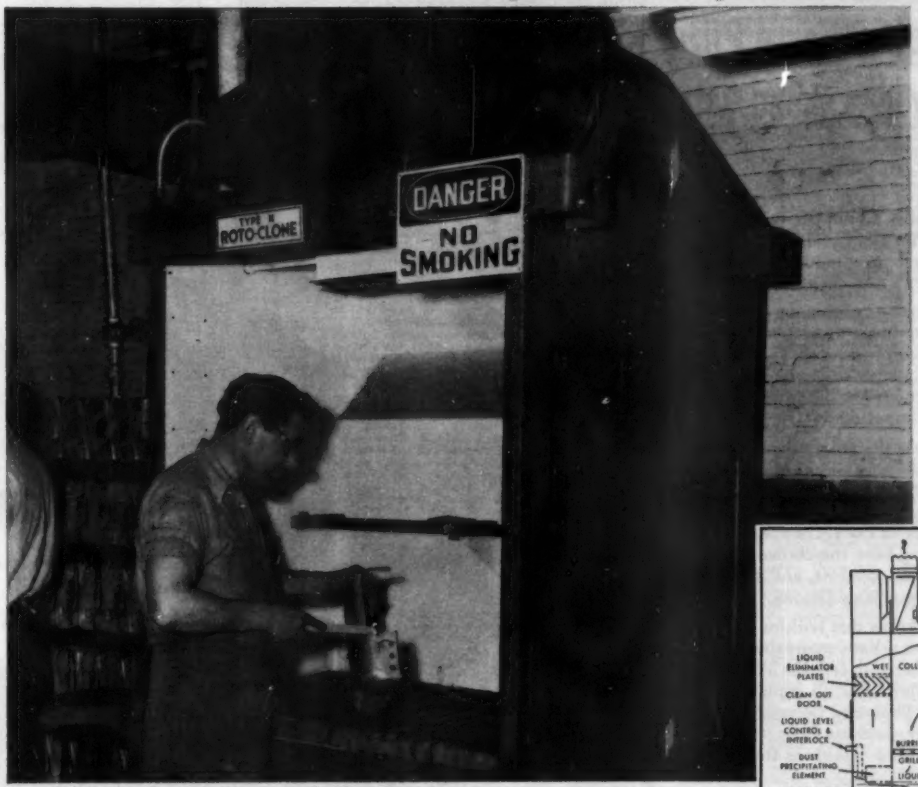
MINERAL WOOL INSULATION Specifications & Standards compiled by Industrial Mineral Wool Institute. Size 6 by 9 in.; illustrated; flexible cover. Published by the Industrial Mineral Wool Institute, 441 Lexington Ave., New York 17, N. Y. Price $3.20.

THIS PRACTICAL handbook has just been published for buyers, engineers, plant superintendents, specification writers and contractors, as a guide in proper selection of material and application practices for government contracts and as a basis for specification within the industry itself. The handbook includes 21 specifications and standards by four government agencies and the American Society for Testing Materials.

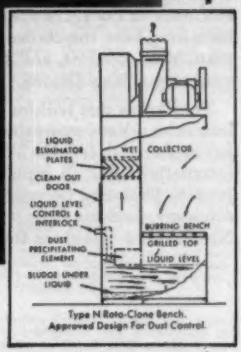
Among the subjects helpful in specifying and installing mineral

(Continued on page 114)

today's best buy is better air!



Type N Roto-Clone Bench for Magnesium Finishing Operations. Dictaphone Corporation, Bridgeport, Connecticut



Type N Roto-Clone Bench. Approved Design For Dust Control.

SAFELY EQUIPPED
for light metal finishing

AAF ROTO-CLONE Type N Bench Removes Hazard Of Magnesium Dust at Dictaphone Corp.

The Type N ROTO-CLONE* dynamic precipitator has a remarkable safety record in efficient collection and safe storage of dangerous dust .Developed by AAF engineers for magnesium finishing, this unit or bench type wet-collector has no moving parts, pumps or nozzles, yet maintains the highest efficiency in collecting extreme fines.

The Type N ROTO-CLONE immediately removes incendiary dust from the source by passing entrained material through a sinuous water curtain under heavy turbulence . . . induced by the flow of air through a stationary impeller. Dust is stored at once in sludge form within the base of the self-contained unit, and under water for complete safety.

The eleven sizes and three arrangements of Type N meet requirements for all dangerous finishing operations, such as stand grinding, burring, buffing, sawing, etc. Unit design also provides additional safety factors by allowing isolation of operations.

If incendiary dust is one of your problems, call your nearby AAF representative or write for Engineering Bulletin No. 277 A.

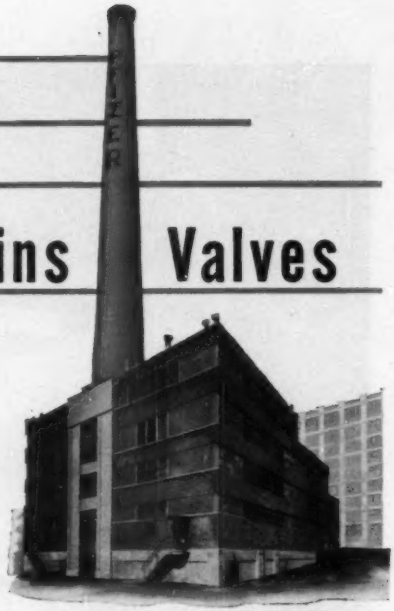
**ROTO-CLONE, is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

AAF **American Air Filter**
COMPANY, INC.

228 Central Ave., Louisville 8, Kentucky • In Canada: Darling Bros., Ltd., Montreal, P. Q.

Power House and Process Piping at new 60-acre Pfizer Plant equipped for years ahead with

Jenkins Valves



General Contractors, W. J. BARNEY CORP. Piping Contractors, J. H. MERRITT CO.

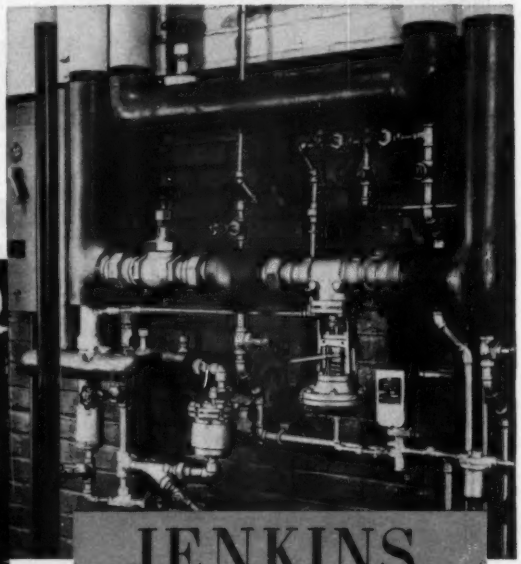
At Groton, Connecticut, the new plant of Chas. Pfizer & Co., Inc., provides additional capacity to meet mounting demands for this company's fine chemicals and antibiotics.

In Pfizer's continuous process manufacture of these products, the dependability of the heat and power supply is vital. That is why you'll find Jenkins Valves in the new power plant, and, in fact, throughout the intricate network of process pipelines.

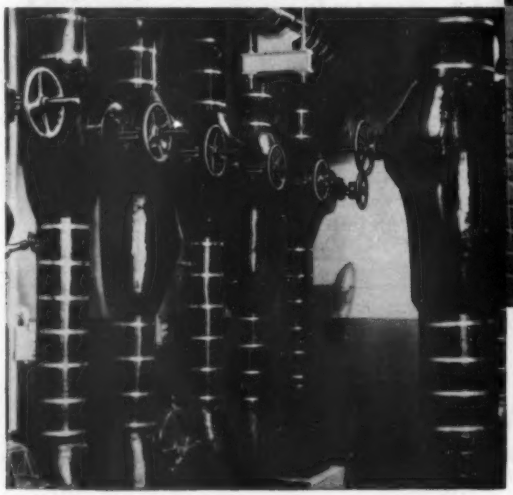
Because the power demand is endless, it requires—even in normal times—unfaltering efficiency of all component equipment. And because operating economy depends on *continued* efficiency in the years ahead, Jenkins Valves have long been the choice of the men who plan, build, operate, and maintain the nation's vital power installations.

They know that Jenkins builds *extra* endurance into valves. Yet despite this *extra* value, *you pay no more* for Jenkins Valves. For new installations, for all replacements, let the Jenkins Diamond be your guide to lasting valve economy. Jenkins Bros., 100 Park Avenue, New York 17. Jenkins Bros., Ltd., Montreal.

Some of the Jenkins Valves installed in the Pfizer power plant. Its rating is 230,000 lbs. per hour from two oil-fired boilers.



Large Jenkins Gate Valves on pipelines serving the 12-step Pfizer process of synthesizing a stable form of crystalline Vitamin A, the first produced on a commercial scale.



JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 — TRADE JENKINS MARK

Jenkins Bros.

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

(Continued from page 46)

molds, recommended hobbing procedure, size of blanks for hobbed cavities. Also contains a selector table giving application of a complete line of mold steels, together with such characteristics as freedom from distortion, ease of heat treatment, surface hardness, wear resistance. The Carpenter Steel Co.

143 Data on Nickel Alloyed Cast Irons—Here's a 36-pp reference booklet giving the engineering properties and applications of Ni-Resist. Describes eight types of austenitic nickel alloy cast irons that offer unusual combinations of properties. Applications and comparative service data in many industrial fields are presented to prove its utility in withstanding corrosion, heat, wear and low temperature. Well illustrated with photos, booklet contains tables of properties and corrosion data on nearly 400 conditions. The International Nickel Co., Inc.

HEATING

144 Direct Fired Heaters—Catalog 802A, 17-pp, presents engineering features of manufacturer's heaters. Photos show a variety of installations. Diagrams show oil and gas piping arrangements. Oil and gas fired capacities are tabulated. Dimensioned drawings cover three different model sizes. Airtherm Mfg. Co.

145 Instantaneous Water Heaters — Twelve-pp Catalog 60 features instantaneous water heaters and other industrial fluid heating units, giving their advantages and illustrating typical installations. Includes useful sizing data, steam consumption tables. General Fittings Co.

146 Heat Transfer—A good portion of Bulletin No. 514, 32-pp, is devoted to practical engineering information on heat transfer in industrial processes. This Technical Data Manual presents features of company's heat transfer units; the information is supported by tables, diagrams, and photos. Airtherm Mfg. Co.

MACHINE SHOP EQUIPMENT

147 Grinding Text — "The Art and Science of Grinding" is a 42-pp pocket-size booklet featuring 36 questions on grinding wheels answered by an expert. Also provides excellent information on many types of wheels, their manufacture and use. Tabular data on operating and peripheral speeds is given, also flange dimensions. The Sterling Grinding Wheel Div., The Cleveland Quarries Co.

148 Cutting Tool Maintenance — Booklet 10, 72-pp, is loaded with useful information about tool grinding and well illustrated with photos and diagrams. Individual attention is given to: Lathe and planer tools, cutters and reamers, chasers, drills, taps, and broaches. A section is devoted to grinding wheels and their recommended use. Ten pages present enlightening matter on surface, cylindrical, and internal grinding as well as lapping. Wheel grading recommendations are given, and articles on coated abrasives and tool room sticks are included. The Carborundum Co.

149 Hydraulic Puller—New catalog insert announces the manufacturer's center hole Power-Twin hydraulic puller. Working potentials of this tool, used with attachments, are presented in table form. Emphasis is drawn to its specialized uses. Owatonna Tool Co.

WELDING, HARDFACING, METALLIZING

150 For Better Arc Welds — "Welding Electrodes and Weldors' Vest Pocket Guide" is a 40-pp booklet of useful arc welding information. Includes information on metals and electrodes, types of electrodes, essentials of proper welding procedure, color marking for identification, types of joints, typical positions, standard steel shapes, characteristics of the fillet weld, causes of common welding troubles, average electrode consumption. The Hobart Brothers Co.

151 Lightweight Metallizing Gun—Bulletin 95 introduces manufacturer's Type 5E metallizing gun designed for spraying 3/16 in. wire and weighing only 4¾ lb. Design features are described, illustrated by cutaway drawing. Metallizing Engineering Co., Inc.

152 Aluminum Tank Welding—Here's an 8-pp article, "Field Welding of Aluminum Tanks," which describes erection procedure for a 200,000-gal and six 30,000-gal aluminum tanks. The welding sequence used to prevent distortion or warping of plates is discussed and photos show each step during erection of the tanks. Chicago Bridge & Iron Co.

153 Welding Rods and Procedures — Publication B-13 is a 24-pp new edition of company's popular booklet giving the applications and procedures for production and repair welding, and for building up worn surfaces with bronze rods. Welding techniques discussed include the oxyacetylene torch, metal-arc, carbon-arc and inert-gas shielded arc. U. S. Navy and Federal specifications as well as other tabular data on copper and copper alloy welding rods are included. The American Brass Co.

154 Hard-Facing Guidebook—Now available to plant engineers is the 48-pp practical booklet covering manual hard-facing applications. Gives recommended procedure for hard-facing of heavy equipment used in the construction, smelting, rock industries, cement plants, other industries. Tells type of rod best suited to each job, quantity required. Not an instruction book of welding fundamentals, this booklet is intended to serve as a handbook for selecting the alloy producing greatest service life, considering such factors as initial cost and speed of application. Discusses in detail eight hard-facing alloys, also manganese and high-carbon build-up rods. Stoody Co.

155 Welding Accessories — Sixteen-pp Catalog EW-164-S lists company's complete line of arc welding accessories and supplies. Protective clothing, cleaning tools, electrode holders, welding cable, connectors and splicers, clamps and other products are pictured along with necessary application and ordering information. Hobart Brothers Co.

STEAM GENERATION

156 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Although written for engineers, its explanations of induced draft, dry steam, four-pass downdraft design, 8 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment will be of interest to all concerned with selection and specifications of such equipment. Superior Combustion Industries, Inc.

157 Steam Generators—Bulletin 1218 on company's Powermaster units for steam or hot water use. Describes high or low pressure units from 15 to 500 hp. Gives details on special burner design and units' ability to be changed from oil to gas firing in minutes. Orr & Sembower, Inc.

158 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, per gallon and per cubic foot. Calculator takes into account the efficiency of the system. On its reverse side is an easily-used slide showing company's boiler horsepower, lb of steam per hour, output, and fuel consumption. Various grades of oil and Btu gas are defined, also steam terminology. Cleaver-Brooks Co.

VALVES, PIPING AND ACCESSORIES

159 Boiler Blow-Off Valves — Bulletin B-425, 24-pp, is a new edition of company's booklet on blow-off valves and provides up-to-date information on valves for pressures to 400 lb. Describes and illustrates two types of seatless valves, also double-tightening valves, giving construction features, specifications, dimensions and prices, and picturing typical installations. Yarnall-Waring Co.

160 Power Plant Valve Reference Guide—A handy, quick reference guide to manufacturer's cast and forged steel valves primarily for power plant installations, including industrial, is designed for easy identification of valves applicable to such uses. These valves are illustrated and described in detail; other valves are listed, but described briefly. Pictorial content covers company's Univalves, blow-off, instrument, non-return, cast steel check, and cast and forged steel globe and angle valves. Special design features of the line are presented. Edward Valves, Inc.

161 Water Hammer—Cause and Cure—The cause, effect and control of water hammer in piping systems are considered in 8-pp Bulletin WH-851. Provides test data covering the intensity, action of the pressure wave, and origin of water hammer. Also includes results of tests made to determine effect of check valves in overcoming water hammer. Findings reported in this booklet for water hammer are believed equally true of cold and hot water, condensate, whitewater, boiler feedwater, gasoline, hot caustic soda solution, acids. The Williams Gauge Co.

162 Insulation Data—Bulletin 4 h, 8-pp, presents characteristics and advantages of company's Thermalite 85% Magnesia insulation for covering pipe, fittings and equipment. Tables include recommended thicknesses for various temperature ranges. Text summarizes recommended application procedure. Other insulations briefly described include a high-temperature insulation, insulating and finishing cements,

November, 1951
Card void after 6 months.

PLANT ENGINEERING

Please have manufacturer send without obligation information or bulletins indicated by following numbers.

.....

.....

.....

.....

.....

Please Print or Typewrite

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City ..... State .....

(If you prefer delivery at your home also fill below)

Home Address .....

City ..... State .....

.....

.....

.....

Also, use this card for more information on advertised products.

asbestos sponge felt, air cell, hair felt, wick and rope. Ehret Magnesia Mfg. Co.

163 **Steam Specialties**—General Circular 715 illustrates and describes briefly company's separators, traps and boiler trim. Also lists specific literature available on each type of equipment. Wright-Austin Co.

164 **Industrial Expansion Joints**—Forty-pp Catalog 51 contains over 78,000 possible combinations of bellows type expansion joints and serves as a reference handbook, illustrating standard and special assemblies used to take up expansion, contraction and offset movements in pipes and conduits. Several unique designs are described, as well as unusual bellows applications for absorbing motions resulting from pressure or temperature changes in conducted gases and liquids. These assemblies range from ⅛ to 72 in. pipe sizes, cover pressures from vacuum to 1000 lb, and are made from stainless steel and a variety of heat and corrosion-resisting alloys. Solar Aircraft Co.

165 **Tube Fittings**—Catalog B-151, 12-pp, describes and illustrates company's complete line of Swagelok tube fittings, available in brass, aluminum, steel, stainless steel and Monel. Complete dimensional information, cross section drawings, installation recommendations and assembly instructions given. Crawford Fitting Co.

GENERAL EQUIPMENT SELECTION

167 **Government Specification Products**—To simplify for plant engineers the selection of products complying with government specifications, this 8-pp handy reference booklet lists company's products meeting government specifications. Covers rust preventatives, lubricants, metal working aids, cutting oils, and leather and synthetic rubber products. The listing includes the specification number and name and description of the aproved product. E. F. Houghton & Co.

168 **Everything for Process Industries**—The brand new 1952 edition of "BS&B in the Process Industries" is a 20-pp catalog filled with illustrations and descriptive material on company's special fabrication services, immersed coil and direct-fired heaters, bolted and welded steel tanks, walkways and stairways. An expanded section on control equipment includes diaphragm control valves, liquid level controllers, pressure controllers, drainers, regulators, safety heads and pressure-vacuum vent valves with flame arrestor units. Black, Sivalls & Bryson, Inc.

169 **Power Plant Equipment Guide** — Twelve-pp Bulletin S-196-C, describing in condensed form company's line of power plant equipment, is profusely illustrated with photos, flow diagrams, dimensional drawings, performance charts and specification tables. Describes control valves, pressure master controls, desuperheaters, temperature master controls, water regulating valves, liquid level and drainage controls, differential pressure controls, feedwater heaters and regulators, separators, exhaust heads, other accessories. The Swartwout Co.

170 **Chemical Products** — Summarizing the principal products of five of company's divisions, this 12-pp booklet lists in tabular form the important uses and applications of the products and, when possible, their specifications. Sections are devoted to coal chemicals, plasticiser, activated carbons, protective coatings and agricultural divisions. Pittsburgh Coke & Chemical Co.

LUBRICATION

171 **How Lubricators Helped**—Blueprint 106 is an industrial case history telling how die life was greatly increased and other wire forming operations improved by use of manufacturer's die lubricator. Includes operating and installation data. C. A. Norgren Co.

172 **For High-Temp Lubrication** — This 8-pp booklet on synthetic lubricants describes their properties and advantages for high-temperature applications. How to use these non-sludging synthetic lubricants in kiln and oven-car wheels; oven-chains and drives; glass machinery, as well as heavy-loaded gears, bearings, and speed reducers operating at high temperatures is presented. Carbide and Carbon Chemicals Co., Union Carbide and Carbon Corp.

WATER CONDITIONING

173 **Water Conditioning Equipment** — This bulletin gives a comprehensive picture of manufacturer's equipment, illustrating each type of unit and telling where it is best adapted for use. Covers monobed and four-column demineralizers, softener-dealkalizers, silica-removing demineralizers, deaerating heaters, degasifiers, filters and storage tanks. Performance figures on four typical units given. Penfield Mfg. Co., Inc.

174 **Boiler De-Scaler**—A comprehensive folder on the mechanics of scale formation and corrosive action in boilers. Tells what the company's descaling unit is and what it does to eliminate scale formation. Butler Engineering Co.

PLANT RECORDS

175 **CMP Made Easy**—This valuable data book, 20 pp. explains various types of records a manufacturer must maintain under the Controlled Materials Plan. Describes methods of filing applications for the allotment of both Class A and B materials and various forms required for material requirements, allotment accounting and purchasing, material controls. Also pictures equipment designed for holding records. Diebold, Inc.

176 **Copy Machine** — Folder describes manufacturer's redesigned machine for office photocopying. Photos illustrate the Dexigraph in use; performance features are presented with machine specifications. A reduction chart compares the maximum sizes of original versus Dexigraph print. Remington Rand Inc.

OTHER EQUIPMENT

177 **Why Vacuum Blast Cleaning**—This newly published 24-pp catalog tells in detail the uses and advantages of company's Vacu-Blaster movable blast-cleaning equipment for metal, concrete, brick, stone or wood surfaces. Illustrations show operation. Special sections explain its merits in welding operations, and in maintaining of rolling stock, plants and buildings. Another section covers unusual or difficult applications. Includes operating details on the generator-reclaimer and dust collector units, accessories, and on the Vacu-Veyor for high speed transfer of bulk granular materials. Vacu-Blast Co., Inc.

178 **Where Refuse Is Fuel**—Presented in 24-pp Bulletin are installations of company's RotoGrate stokers with medium-size and larger units burning refuse fuels, separately or in combination with coal. Lists many of the refuse fuels handled successfully by this type of spreader stoker. More than 20 such installations are described, illustrated by drawings and photos. Detroit Stoker Co.

179 **D-C Motor Brake**—Bulletin 1004-E, 8 pp, discusses features of the Type WB brake, reported by the manufacturer to be radically different, in some details, than any other brake. Torque rating and dimensional tables are included along with some installation photos. The Electric Controller & Mfg. Co.

180 **Vacuum Impregnation** — Catalog 710 is a 24-pp comprehensive text on vacuum impregnation, in which the process is explained, a list of applications is given and the equipment used is described and pictured. Vacuum impregnation permits treatment with impregnants of many materials difficult to treat under atmospheric pressure, and some typical examples of current industrial use are discussed. Book is fully illustrated, includes specifications of impregnators and storage tanks. The F. J. Stokes Machine Co.

181 **Industrial Burners** — General Bulletin 751 describes and pictures company's gas-oil burner equipment for a wide range of applications and includes photos of many installations. Equipment covered includes several types of burners, control equipment, combustion units, fuel oil pumping and heating units. National Airoil Burner Co., Inc.

182 **Tape Facts for Filing**—Designed for handy reference use, this ingenious "catalog" is in the form of five file cards, standard 8½ by 11 in. size, conveniently held together in a cardboard folder. Tabs remain clearly visible and cards are easily removed. Cards are provided for general purpose tapes, electrical tapes, specification and special purpose tapes, and general information. Across each card are sample strips of the tapes described, along with technical specifications and data on uses. Bauer & Black Div., The Kendall Co.

183 **Asbestos Packings**—This 8-pp illustrated bulletin describes and gives service recommendations for braided and twisted asbestos packings. Covers twisted valve stem, braided valve stem, high temperature valve stem, braided round and squared, square plaited braid, oil-resistant and braided blue packings. Lists standard sizes, specifies packaging, and gives approximate weights of the several types. Packing Div., Raybestos-Manhattan, Inc.

184 **Diesel Engine** — The Supairthermal engine design, operation, and engineering features are covered by 12-pp Bulletin 191. Illustrations include comparative cycle diagrams and installation photos. Comparative test data of typical engines, and BMEP ratings are presented in table form. A full page is given to a heat transfer nomograph and its use. Nordberg Mfg. Co.

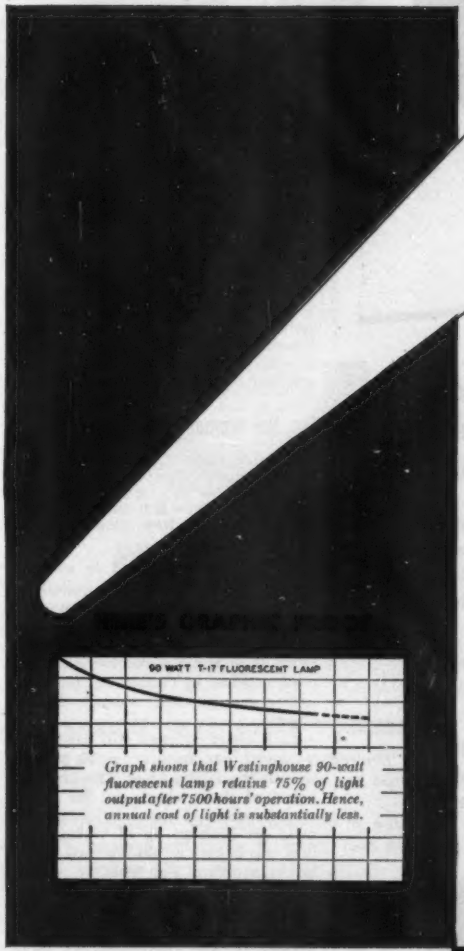
Sec. 34.9, P. L. & R.
FIRST CLASS
CHICAGO, ILL.
PERMIT No. 353

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In the United States

POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

NOW—LIGHT OUTPUT OF WESTINGHOUSE 90-WATT FLUORESCENT LAMP TOPS ALL OTHERS IN ITS CLASS


90 WATT T-17 FLUORESCENT LAMP
Graph shows that Westinghouse 90-watt fluorescent lamp retains 75% of light output after 7500 hours' operation. Hence, annual cost of light is substantially less.

New Improvements Boost Light Output Throughout 7500 Hours Of Operation

The improved *light maintenance* of this exclusive Westinghouse Krypton-Argon 90-watt T-17 fluorescent lamp means that even after 7500 hours of operation it will continue to produce the highest lumen output of any lamp in its class. This gain in light efficiency makes the lamp still more economical for industrial and commercial use.

The improved Westinghouse lamp provides a higher average foot-candle level, and reduces the annual cost of light. It makes a group lamp replacement program more practical and economical. What's more, the Westinghouse 90-watt lamp is designed to operate in any standard 85- or 100-watt T-17 lighting equipment.

For more detailed information on how this new lamp can fit into your present or planned lighting installations, write to Lamp Division, Westinghouse Electric Corporation, Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S Westinghouse

"Small-Boiler Operators... Now you can even collect nuisance dust from natural draft boilers!"

Buell 'LR' Collector Proves Highly Efficient for Boilers from 100 to 2,000 BHP!

Now, with the new Buell 'LR' Dust Collector, you can meet today's dust abatement demands. For, the 'LR' Collector gets 99% of all 100-mesh, and larger, cinder discharge.

What's more—draft loss with the 'LR' is so low—you can even use it on the smallest natural draft boilers.

For full information on how the Buell 'LR' Dust Collector can help you solve your Fly Ash problem, write today. Ask for the new 'LR' bulletin. Buell Engineering Company, Dept. 14-K, 70 Pine Street, New York 5, N. Y.

buell

Engineered Efficiency in **Fly Ash Collection**

(Continued from page 108)

wool insulations for most satisfactory and reliable performance are: types of products, physical properties, characteristics, construction, selection, standard dimensions, temperature limits, thicknesses, auxiliary materials, application techniques and testing methods. Specifications by each of the five agencies are placed together in sections identified by celluloid tabs. The handbook, with removable binding posts, may be kept complete and up-to-date by the insertion of additional pamphlets, data, notes and newly-issued specifications.

Standard on Drill Drivers

DRILL DRIVERS, ASA B5.27-1951. Size 8½ by 11 in.; 8 pp; illustrated. Published by the American Society of Mechanical Engineers, 29 W. 39th Street, New York 18, N. Y. Price 45 cents.

THIS STANDARD on drill drivers of the split-sleeve, collet-type is sponsored by the Metal Cutting Tool Institute, Society of Automotive Engineers, National Machine Tool Builder's Association and the American Society of Mechanical Engineers.

The standard was developed to insure close tolerances in assembly of drill to driver. It gives taper dimensions, general specifications and dimensions for 135 sizes of drill drivers along with the standard and optional taper number for each size.

For the Nomograph Experts

NOMOGRAPHIC CHARTS by C. Albert Kulmann. First edition; size 7½ by 10 in.; 244 pp; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $6.50.

IF YOU ARE interested in making speedy mathematical computations in a wide variety of engineering fields, this book will prove very useful. Charts are included for such fields as hydraulics, mechanics, thermodynamics, electrical engineering, and some general subject handy charts.

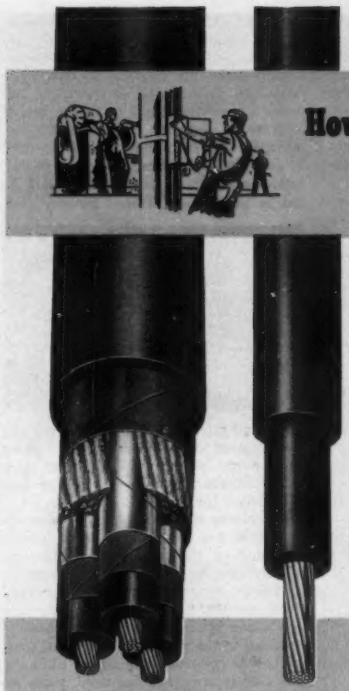
Each chart covers a full page with a concise explanation for its proper use on the facing page. The greatest value of these charts is the time-saving effected by obviating the need for looking up in various tables the values of the various items in the problem. For instance, where factors in a problem may be modified by exponential functions or varying empirical multipliers or similar variations, the chart scalings have taken them into account.

The nomograms are not all of the alignment type. In many cases there are intersection nomograms or combinations of intersection and alignment nomograms.

How You Can Prevent Costly Power Stoppages...

RoZone®

INSULATED CABLE



Unretouched photo of RoZone specimen after long-time ozone test.

Unretouched photo of conventional rubber specimen after short-time ozone test.

You can always count on Rome RoZone Insulated Cables to keep power flowing even under the toughest plant conditions. A premium oil-base insulation, RoZone has high dielectric strength and superior resistance to corona and ozone cutting, where high voltages are involved. That, coupled with an exceptional ability to withstand the effects of moisture, heat and aging make RoZone a sure bet in preventing costly power stoppages due to cable failure.

For Double Protection
RoZone - RoPrene

Here's a cable combination that gives you all the excellent protective features of RoZone insulation—*plus* an all-resistant RoPrene (Neoprene) sheath. RoPrene has strong abrasion resistance . . . is unaffected by oils, acids, alkalies, moisture and flame. It is the ideal alternate for heavier and more expensive lead sheath.

A "natural" for plant power distribution systems, RoZone-RoPrene is proving its worth in paper mills, chemical plants, steel mills and other industries throughout the country. It's available as a single or multiple conductor for service ratings up to 8000 volts. It may be installed direct in earth, in conduits, in racks or trays, aerially . . . or in combination circuits.

The Rome Power and Control Cable Catalog will show you why it will pay you to specify RoZone-RoPrene. Mail the coupon today for your copy.

ROZONE INSULATION POSSESSES

- High dielectric and impulse strength
- Excellent resistance to corona and ozone cutting
- Remarkable electrical stability in water
- Inherent resistance to aging, heat and sunlight

Copper wire mill products are a Controlled Material under N.P.A. Controlled Materials Plan. USE YOUR CMP ALLOTMENT.

It Costs Less To Buy the Best

ROME CABLE CORPORATION, Dept. PE-11, Rome, N. Y.

Please send me a copy of the Rome Power and Control Cable Catalog.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

NEW PRODUCTS

summarized for your convenience

FAST-WORKING BRAKE—Fast, controlled braking of company's Varidrive Motors is now effected by means of a Warner Type IBC Brake mounted directly on the variable speed shaft, eliminating transmission of braking action through the belt. Manufacturer reports that this is ideal for inching or jogging, offers instant, shockless operation without noise, and produces a constantly increasing torque during stopping. Containing few parts, the compact IBC has a mechanical movement of only 1/16 in. Its frictional force is controlled directly by magnetic action of the brake. The braking torque, once set, is permanent. For installations requiring diversified braking torque, adjustment is made through a knob-controlled rheostat.

Adaptable to company's Varidrives and Varidrive-Synchogears, this brake is d-c actuated with low power requirements—maximum 25-35 w. Power conversion units are used where a-c voltage is supplied. *U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54, Cal.*

FIRST in actual Fresh Water Corrosion Test!

Pitt Chem 520 Phenolic System resists fresh water corrosion more effectively than any other coating tested! That's the record established by an eight year field test of fourteen basic types of coatings produced by six leading coating manufacturers. The impartial test was conducted on the lift gates of a power dam by a large Eastern public utility company. Only Pitt Chem 520 Phenolic Zinc Dust-Zinc Oxide System was still in serviceable condition at the end of the test. All others had failed—some within four years.

If *you* have a fresh water corrosion problem, in storage tanks, reservoirs, power dams or water transmission systems, we can help you check corrosion, reduce maintenance costs, and lengthen equipment life. ● *Technical information and engineering assistance are yours for the asking.*

★ Hot Applied Tar Base Coatings
★ Cold Applied Tar Base Coatings
★ Alkyd Base Coatings
★ Chlorinated Rubber Base Coatings
★ Vinyl Base Coatings
★ Phenolic Base Coatings

W&D 3892

Protective Coatings Division
PITTSBURGH COKE & CHEMICAL CO.
GRANT BUILDING • PITTSBURGH 19, PA.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

A-C RECORDING UNITS—A new, trouble-shooting combination, the TAG Recording Ammeter and Weston Clamp-Ammeter Unit Model 633, Type AIR-A2R, is designed to check on and make a permanent record of the use of alternating current and circuit reactions. The combination can be used to cover all operations within a power, manufacturing or processing plant, to aid in preventing wasted power, time,

labor and money. Records obtained can reveal good or bad handling of plant equipment, company points out, also detect unwarranted use of power and production line time.

The clamp unit can be used for making rapid a-c measurements on either insulated or non-insulated conductors. It functions on the magnetic induction principle. By means of a rectifier network within the instrument, the induced a-c is rectified into d-c which is supplied to the recording ammeter. Described as compact, convenient and safe, the clamp unit can be used with an extension cable several hundred feet long to connect to the recorder. Additional information on this instrument combination will be supplied on request. *Tagliabue Instruments Div., Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.*

MOTOR-GENERATOR SET—Designed to convert 60-cycle current to 180-cycle and 360-cycle frequencies, this new mono-coil high frequency motor generator set finds its greatest use in plants using high cycle automatic electric grinders, buffers and similar tools. Sets are self-exciting and have built-in voltage regulations to automatically compensate for fluctuations in voltage to the load. *Electric Machinery Mfg. Co., Minneapolis 13, Minn.*

TROLLEY WITH FLUID COUPLING—Announced as the first application of fluid transmission to hoisting equipment is a newly developed motor driven trolley with a hydraulic coupling which transmits power from motor to drive unit through a cushion of oil. According to manufacturer, this arrangement means greater operator and load safety, lower hoist maintenance costs, and the elimination of trolley brakes and speed acceleration equipment.

Since the motor in this trolley starts unloaded and comes to 85 per cent of full speed before starting the load, there is no prolonged inrush of current, company points out. Power requirements are thus greatly reduced, with an accompanying reduction in motor heating and maintenance. The smooth operation and acceleration credited to this

DIAMOND ROLLER CHAINS

No Slipping...High Efficiency...Long Useful Life

● Plant men concerned with preventing production delays and holding machinery operations to top levels have followed the example of leading builders of machinery and equipment. They have seen what the long-life reliability of Diamond Roller Chains, their high efficiency and constant speed ratio, non-slipping operation mean under today's strenuous preparedness production programs.

For motor drives, special operations, conveying and timing mechanisms, Diamond Roller Chains are being applied more widely by plant men than ever before.

DIAMOND CHAIN COMPANY, Inc.

Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

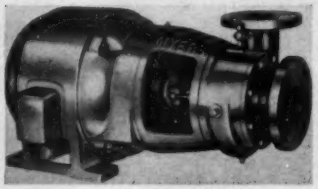
trolley are also said to minimize shock loads and eliminate torsional vibration, resulting in longer life of driving unit and motor. Only maintenance needed by the coupling itself is an occasional check of oil level.

Increased safety also results from the smooth and gradual acceleration because it reduces swinging or pendulum action by the load. Also, freedom of shock to load and motor provided by the fluid coupling is said to permit reversal of motor from full speed forward to full speed reverse. The new coupling is available for all of company's power driven trolleys of ⅛ to 12 t capacity. *The Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.*

IMPROVED SEALANT—A new stabilizing ingredient has been added to Flextite to speed up action in sealing off leaks, water seepage in concrete walls. The new Flextite is reported to provide quicker action and more thorough bonding, hence increased protection. A liquid chemical to be mixed with cement and sand, Flextite produces a mortar described as easily handled and fast setting.

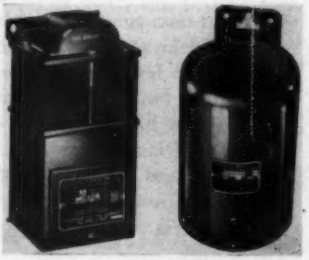
When forced into an opening—even against hydrostatic pressure — Flextite is said to seal off severe, fast-flowing leaks in engine rooms, elevator pits, tunnels, dams, and tanks in a matter of minutes. This material is also suggested for plaster-coating walls above or below ground or water level, for pointing up spalled areas, and for converting damp factory basements into useful space. Manufacturer offers descriptive literature and details of trial order plan. *Flexrock Co., Filbert and Cuthbert, West of 36th St., Philadelphia 4, Pennsylvania.*

CENTRIFUGAL PUMPS—General duty pumps of the horizontal, single suction, single stage type, with enclosed impellers, these are said to embody mechanical and hydraulic advances in design for pumping hot or cold water, light oils, other liquids. The pumps are built in three types: motor mounted or close coupled, direct connected with base plate and coupling, and belt driven models. They are furnished standard fitted, all bronze or all iron in either high or low head models at speeds of 3500 and 1750 rpm. They are intended for pumping 10 to 600 gpm against total heads to 280 ft at temperatures to 220. *The F. E. Myers & Bro. Co., Ashland, O.*

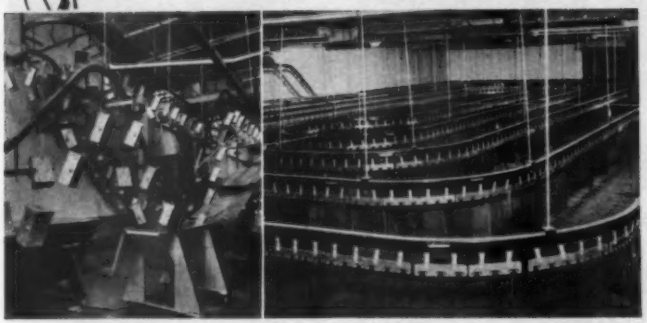


SHORT CASE SEALERS—Junior Case Sealers are considerably shorter and narrower than company's present models, and employ a new flight chain construction said to virtually eliminate jamming of cartons. They are also adjustable and will handle a wide range of carton sizes. Further information on the three models available will be furnished by manufacturer. *A-B-C Packaging Machine Corp., P. O. Box 45, Quincy, Ill.*

LAMP TRANSFORMERS—A revised line of transformers for operation of this manufacturer's mercury vapor (H-1) lamps is announced as including both indoor and outdoor types. The indoor transformers consist of single- and two-lamp units—normal and high power factor—available for 115 and 230 v circuits. They're equipped with roomy wiring compartments having ½ and ¾ in. knockouts.



How to keep your production line **Really Rolling!**



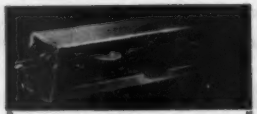
INCREASE EFFICIENCY . . . LOWER COSTS . . . WITH

R-W "Zig-Zag"® Continuous Power Conveyors

Industrial plants in almost every category are today solving complex handling and production problems with ingenious "Zig-Zag" Conveyors made exclusively by Richards-Wilcox. Specifically designed to carry light loads through confined or crowded areas, to keep production and processing lines rolling more efficiently, "Zig-Zag" Conveyors are ideally suited to *any* size plant, and effect such substantial savings that the equipment usually *pays for itself in less than a year!*

* * *

Investigate now the advantages of installing this revolutionary materials-handling system in your plant. For detailed information about R-W patented "Zig-Zag" Conveyors, write, phone or wire our nearest office today.



Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through a special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Look for R-W booths 525, 534-5-6 at the Materials Handling Exposition, Chicago

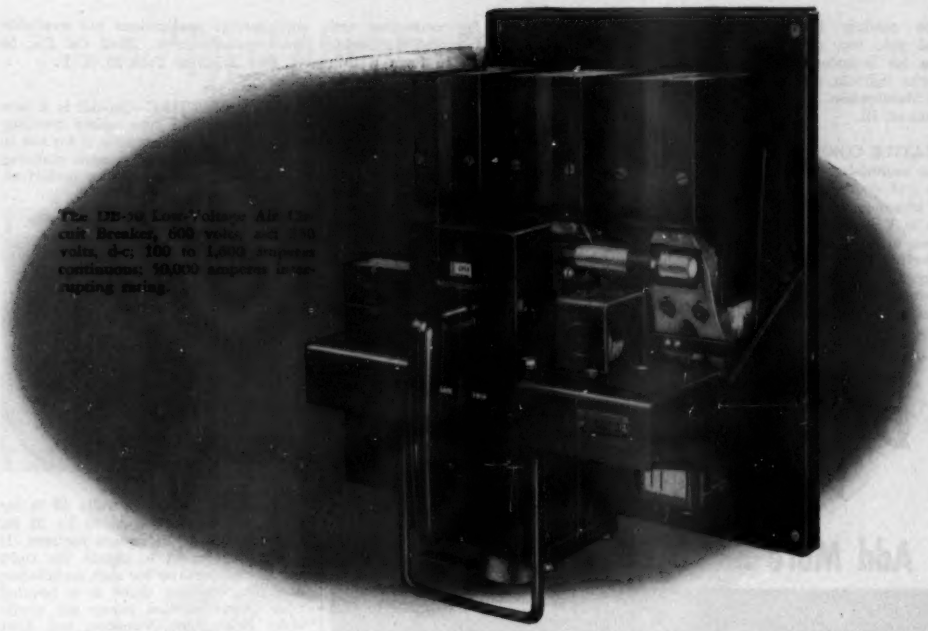
1880 1951

Reg. U. S. Pat. Off.

OVER 71 YEARS

Richards-Wilcox Mfg. Co.

AURORA ILLINOIS U.S.A.



NOW...the PROVED DB Breaker Design in 50,000-Ampere Interrupting Rating

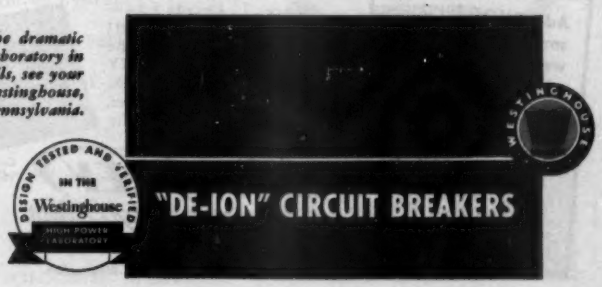
Here's the third member of the DB Air Circuit Breaker family. It's the new DB-50—a modern breaker that fulfills your need for higher interrupting capacity on low-voltage circuits.

Of the same uniform design as the DB-15 and DB-25, the DB-50 includes . . . complete shielding for extra safety . . . subassemblies that are removable as complete components . . . a rigid all-metal mounting base. General construction and operating characteristics are similar to the DB-15 and DB-25 breakers.

To match the improved performance offered by the new 50,000-ampere breaker, a series tripping device has been developed which provides all the basic delay characteristics required for motor circuit protection or for use in selective tripping systems. By use of filtered air as the escapement medium and by incorporating adjustable features to all pickup and delay settings, a tripping device has been provided which is both versatile in application and precise in operation.

Booklet B-4740 contains complete information on the DB-50. The DB-15 and DB-25 units are covered in B-4067. For copies, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60747

See "Electrical Proving Ground" . . . *the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse representative, or write Westinghouse, Film Division, Box 868, Pittsburgh 30, Pennsylvania.*



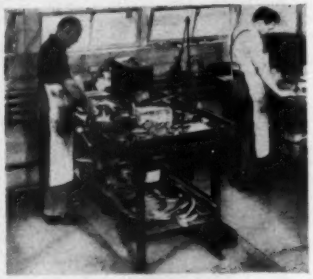
The outdoor transformers include aerial pole top, pole base, and vault types for boundary lighting, building exterior lighting, parking and shipping area illumination. *Jefferson Electric Co., Bellwood, Ill.*

VOLATILE CORROSION INHIBITOR—An economical method of preventing rust and corrosion of metal parts, in the presence of air and moisture, is seen in VPI crystals, a slightly volatile amine nitrate. VPI is being used in protecting metal parts, assemblies, instruments and finished products during shipment, storage and processing.

Being slightly volatile at atmospheric temperatures, VPI gives off vapors which are carried by convection and diffusion to all surfaces of the metal, where they condense to form a thin protective layer. Metal parts so protected are ready for use; there is no oil or grease to remove.

VPI, a powder-like substance, can be applied by enclosing it in a package with the parts to be protected; by blowing it into the area to be protected; by putting it into a water or alcohol solution and covering the metal parts in tote boxes. A little goes a long way—company says 1 g will protect 1 cu ft of metal surface for a year. An unusual characteristic attributed to VPI is that of arresting corrosion at advanced stages. Further data on VPI and special applications are available from manufacturer. *Shell Oil Co., 50 W. 50th St., New York 20, N. Y.*

SAFETY MATTING—Do-All is a new rubber and cord type safety matting. Manufacturer recommends it for use in front of machinery to provide standing comfort as well as safety underfoot.



The matting comes in rolls 20 ft by 5 in. long, comprised of 35 by 35 in. units of four 17 in. square sections. It can be cut apart to obtain the right number of sections for each installation and after cutting there is a beveled edge. Four mottled colors are available: Erin green, Venetian red, delft blue and mosaic. Write for brochure and prices. *American Mat Corp., 2111 Adams St., Toledo 2, O.*

OPEN-END CAPS—For pigtail splicing of electrical wires, the new Splice Caps have open-end construction to facilitate installation and inspection. This design is said to insure that wire insulation is always flush with the Splice Cap for maximum circuit protection, and that wires are always inserted to full depth of the Splice Cap. Only two sizes of these caps are needed for most frequently used combinations of two or more wires. Company's hand-operated Pres-Sure Tool which installs both sizes of the caps also installs company's Termend Lugs on wire sizes from 16 to 8. *Buchanan Electrical Products Corp., Hillside, New Jersey.*

SPRING COMPUTER—Problems of spring design can be quickly solved with the Calculaide Spring Computer. According to the manufacturer, this computer correlates, in one setting, all variables in spring design—outer diameter of spring, wire size in diameter, and gage number, number of active coils, material and its torsional modulus G, maximum sheer stress load and total deflection.

All scales appear on one side of the computer, and figures are read directly, without computation, as no reference is made to a standard load, standard stress etc. The stress scale includes correction for non-linear distribution of torsional stresses in curved wires. The Calculaide is claimed to be the only spring computer giving correct results for great deflection of extension springs.

Made from sheets of tough, Vinylite

DECIDE NOW—

To Add More BRADLEY WASHFOUNTAINS

8 to 10 are accommodated simultaneously at a 54-in. Bradley. Self-flushing bowl prevents collection of waste water.

• Adequate and sanitary washroom facilities are as important as any of your safety measures.

Because Bradley Washfountains provide the maximum in sanitation they help prevent unnecessary absences . . . Each of 8 to 10 persons is provided with clean running water from the central sprayhead, and, with foot-control hands touch nothing but the cleansing water. Water flow is cut off when users leave the Washfountain.

Bradleys provide more facilities in less space . . . Decide now—our latest Catalog 4701 will help you select the correct type. BRADLEY WASHFOUNTAIN CO., 2371 W. Michigan Street, Milwaukee 1, Wisconsin.

Catalog 4701

Add DUOS for smaller washrooms

For executive, general office, engineering department washrooms, Bradley DUO-Washfountains have foot-control, sanitary water spray, no faucets to touch or service, and self-flushing bowl to prevent accumulation of dirty water.

BRADLEY Washfountains

Distributed Through Plumbing Wholesalers

"Tycol Aturbrio remains stable... gives full protection against system moisture corrosion"

Yes, sir! Tycol Aturbrio Oils are "double inhibited" to resist oxidation and prevent rust. They provide maximum resistance to emulsification . . . permit continuous operation with minimum wear. They have reduced hydraulic system operating costs in hundreds of plants . . . performing superbly and assuring minimum wear of moving parts.

Complete information is available from your nearest Tide Water Associated office. Call or write today.

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE NEW YORK 4, N.Y.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

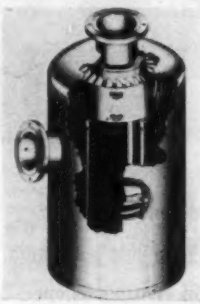
plastic, with markings and scales indelibly laminated, the Calculaide is 11-3/8 by 5 in. It is said to be unaffected by moisture or ink and easily cleaned with a damp cloth. List price is $3.95. *American Hydromath Corp., 145 W. 57th St., New York, N. Y.*

PROTECTIVE COATING—Tarlac is a coal tar pitch processed into a fast drying protective coating by breaking it down into minute molecules then combining it with water and a stabilizing emulsification agent to form a permanent suspension that can be brushed or sprayed.

Tarlac is said to retain all the protective and adhesive qualities of coal tar pitch, and to be impervious to oils, greases, other petroleum derivatives, acids, alkalis, water and condensation. It is reported to be good from -56 to 200 F, non-cracking at low temperatures and non-running at high temperatures.

Company recommends Tarlac for protecting concrete structures, floors, masonry, metals exposed to corrosive elements, mastic floors and other black top surfaces, also wood platforms and other exposed wood. Tarlac dries to a tough, flat black film, is insoluble in water, oil or gasoline. It covers up to 300 sq ft per gal. Comes in 5 gal pails. Bulletin and prices furnished by manufacturer. *Flash-Stone Co., Inc., 30 E. Rittenhouse St., Philadelphia 44, Pa.*

PURIFIER UNIT—Applications for the receiver-type purifier recently added to company's Hi-F line include protection of turbines and steam engines, use in exhaust steam installations, and removal of condensate from compressed



air systems. Among advantages claimed for the purifier are low initial cost, self-cleaning action and careful fluid dynamics designing to provide for handling extreme velocities efficiently and reduce pressure drop.

Entrainment vapor enters at the inlet and drops suddenly in velocity, causing most of the entrainment to drop to the bottom of the drain. Vapor then passes into a multi-stage purifier on the inside of the drum which removes virtually all remaining entrainment. After leaving the bottom of this purifier, the clean steam passes through the receiver outlet.

The new units have forged steel

K-P CONVEYOR BELTS

Korb-Pettit Spiral Woven Wire Conveyor Belts are manufactured in suitable metals and mesh sizes for conveying, material handling, processing and heat treating. Particularly well adapted for foods and other products that require free circulation of air and drainage. K-P Flextrough Belts have flanged edges for retaining small parts. Side chains are provided for sprocket drive.

COMPLETE SPECIAL PURPOSE CONVEYOR SYSTEMS DESIGNED AND MANUFACTURED

•

Infra-Red Conveyor Dryers

•

Leather Finishing and Drying Machines

•

Wire Cloth and Wire Screens

KORB-PETTIT WIRE FABRICS AND IRON WORKS
INCORPORATED
Engineers and Manufacturers
1501 No. Mascher St.
Philadelphia 22, Pa.

KP

NEW! Ask for 40-page K-P Conveyor Belt Catalog No. 31

LIKE AN **ATOM-IC** EXPLOSION

Just ONE 1/32" pin-hole size faucet LEAK MUSHROOMS into ATOMIC WASTE of approximately 76,000 gallons of water yearly—COSTING: $10.13 @ $1 per M cubic feet

If a hot water faucet, then actual FUEL WASTED heating 76,000 gallons costs approximately:

$27.65 if coal (7,900 lbs.)
$38.00 if oil (633 gals.)
$50.63 if gas (67,500 cu. ft.)

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with 'SEXAUER' "Easy-Tite" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.
"EASY-TITE" FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day super-heating water systems—that formerly broke down washer's structure (tested to withstand 300°F.).

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold TAPS—thus you slash water fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition F, just out pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. *Send for your copy today!*

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

A postcard will bring him and your NEW Catalog F promptly.

J. A. SEXAUER MFG. CO., INC., Dept. S-111
2503-05 Third Avenue, New York 51.

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEAT NO. REPAIRS

as advertised in THE SATURDAY EVENING POST

GET big truck advantages at small truck cost with YALE WORKSAVERS

SAVE **TIME AND SPACE.** Move giant loads up to 185 feet per minute—with safe, easy speed control. Utilize *all* storage and production areas.

SAVE **MUSCLE POWER.** Transport and lift capacity loads with a smooth flow of power that's easy on the operator, easy on the load.

SAVE **HANDLING COSTS.** Mechanize handling on low-load floors; in freight elevator operations; and in other areas where weight or space rule out big trucks.

PALLET WORKSAVER

TRACTOR WORKSAVER

PLATFORM WORKSAVER

HIGH-LIFT PLATFORM WORKSAVER

YALE WORKSAVER Electric Hydraulic Lift Trucks are built for loads up to 6,000 lbs., and are ideally designed to accommodate skids or pallets. Their wide acceptance throughout industry is based on the YALE reputation for top performance in electric trucks of *every* kind.

GET AN EYE-OPENING DEMONSTRATION RIGHT IN YOUR OWN PLANT OR WAREHOUSE

Your YALE Representative will demonstrate the cost-cutting advantages of the rugged WORKSAVER line to you. All you have to do is name the time and place. Naturally, there is no obligation.

Be sure to ask about the famous WORKSAVER "package"—*truck, battery, battery charger.* The YALE Selenium Charger saves time by charging WORKSAVERS right on the job.

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

There's a Yale Worksaver to meet your every need

YALE & TOWNE

MAIL THIS COUPON TODAY

The Yale & Towne Manufacturing Co., Dept. 4711
Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Pa.

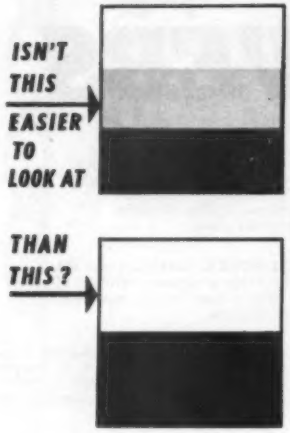
Cutting costs with YALE WORKSAVERS interests me, too.

☐ Please have your local Representative call on me.
☐ Please send me a free copy of the new WORKSAVER Catalog.

Name.....Title.....
Company.....
Street.....City.....State.....
In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS

TRY THIS TEST!



We think you'll agree that the top illustration is far easier on your eyes than the bottom one. This test is a simple demonstration of Tremco's *proved* interior painting system called Contrast Control.

Contrast Control, based on close collaboration between lighting engineers and paint technicians, regulates the brightness pattern of all the various areas in a room. It avoids extreme contrasts — provides comfortable seeing conditions.

Contrast Control improves lighting, reduces eye strain and fatigue, promotes efficiency and morale. It costs no more than any other painting method.

If you'd like to see the results of Contrast Control, call your local Tremco Man and *paint one room.* You'll be astonished at the difference.

The Tremco Manufacturing Company, Cleveland, Ohio and The Tremco Manufacturing Company (Canada) Ltd., Toronto.

SEND FOR FREE BOOKLET

"Your Next Paint Job," an illustrated 16 page booklet, contains a complete discussion of the principles of Contrast Control, as well as other matters of interest to anyone contemplating interior painting. Write for your copy.

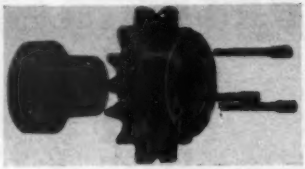
TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

UM-1011

flanges and welded steel bodies and are made in sizes from 4 to 16 in. Receiver type purifiers are described in Bulletin 300. *The V. D. Anderson Co., 1935 W. 96th St., Cleveland 2, O.*

HUB SPROCKET—This sprocket has an interchangeability feature to eliminate reboring for fit. It is designed to fit company's QD V-belt sheave hub without need for reboring of either sheave or sprocket; it is taper bored



to receive the tapered hub. Bolts are provided to pull the sprocket onto the tapered split hub for a tapered drive assembly and a positive press fit on the shaft. Tapped holes in the sprocket permit use of pull-up bolts as jack screws to break the tapered fit when dismounting the sprocket. A set screw over the keyway holds key in position. Sprockets are stocked at factory in ½ through 1-¾ in pitch. *Fort Worth Steel and Machinery Co., 3600 McCart, Fort Worth, Texas.*

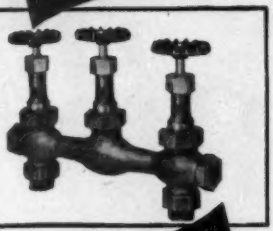
CONDENSATION RETURN UNITS—Designed to save fuel by returning the condensate from steam coils, radiators, or steam operated equipment back to the boiler, these units are equipped with manufacturer's Motor Mount centrifugal pumps. These pumps have enclosed type bronze impeller and stainless steel shaft. The deep stuffing box has conventional packing rings for grease lubrication and the pump is mounted on the legs of the tank. The motor has standard NEMA Type C mounting flange and is furnished for single-phase, two- or three-phase, or d-c, as specified. The complete line includes single and duplex units. *The Deming Co., Salem, O.*

STEP CONTROLLER—Although designed for refrigeration compressor applications, this pneumatic step controller may be applied to many sequence control problems. Capacity control is accomplished by starting and stopping compressors in sequence, loading and unloading cylinders, or a combination of both.

The unit is available in 4-, 6-, 8-, or 12-switch models. Each of the single-pole, double-throw switches is operated by a pair of cams on a shaft which is rotated by a pneumatic piston in response to a pneumatic temperature or pressure measuring instrument. The "on" and "off" points of each switch are individually adjustable over the entire range of operation.

Mounted on a sub-panel inserted in a metal cabinet, the unit is ordinarily operated by a thermostat in the chilled

The COMPACTNESS of HONEYWELL BY-PASSES



will simplify your PIPING

The Honeywell By-Pass is a compact, neat, easily-installed means of by-passing control valves, traps and other pressure units. It simplifies piping arrangements by eliminating a multitude of joints, nipples and elbows . . . by using a minimum of space . . . by saving time . . . by minimizing maintenance.

Available in Bronze as follows: sizes ½ to 2 inches . . . Bronze or Stainless trim . . . union bonnet . . . screwed ends . . . 150-300 lbs. . . . from $21 to $116. Available in Cast Steel as follows: 1 to 2 inches . . . union bonnet for 1" and 1¼", bolted bonnet for 1½" and 2" . . . Stainless trim . . . screwed or flanged ends . . . 300-600 lbs. . . . from $228 to $426. Prices and specifications are subject to change . . . send in your order, today!

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division,* 1914 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

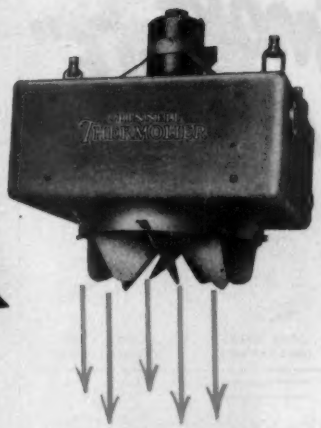
MINNEAPOLIS **Honeywell**

Valve Products

DOWNRIGHT

better performance

Vertical Delivery
THERMOLIER
Unit Heaters . . .

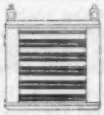


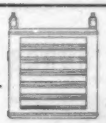
RIGHT DOWN

where maximum heat is desired...

4 MODELS . . . . . 18 SIZES

Vertical Delivery


Horizontal Delivery


Textile Model

Velocity Nozzle

A thermostatic trap, the simplest and least expensive of all traps, is practical because of Thermolier's exclusive cooling leg.

Maximum capacity assured, annoying destructive water hammer eliminated — by built-in pitch of tubes and internal cooling leg which assure continuous drainage of condensate.

Damaging strains caused by expansion and contraction eliminated by "U" type expansion tubes.

Safety and durability assured with leak-proof tube-to-header construction.

Five other important construction features. Write for Thermolier Catalog.

in warehouses, plants and other hard-to-heat buildings

HEATING COMFORT AND ECONOMY. Heat is forced down to the working level . . . not banked uselessly at the ceiling level. Thermoliers provide quick heating from a cold start. Desired room temperatures are easily maintained within a close range.

ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT. The units and the simple piping are overhead where they do not interfere with arrangement of operating machinery or equipment and do not take up valuable floor or wall space. Units are easily relocated at any time to meet changes in plant layout or heating requirements.

LOW FIRST COST. Thermoliers are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost.

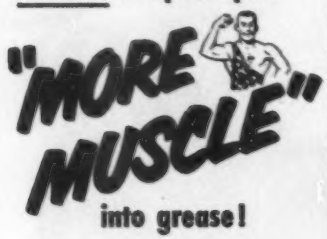
GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company Inc., Providence 1, Rhode Island • Sales Offices and Warehouses in Principal Cities

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco humidification and cooling systems

Natural Graphite puts



into grease!

FOR EXAMPLE:

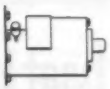
OPEN GEARS
rough treatment

CONVEYORS
moisture, corrosion

HOISTS
exposure to weather

STOKERS
high temperatures, dirt

CHAIN DRIVES
moisture, dust



COUPLINGS
heavy loads, moisture

In Fact:—for *all* applications where conditions of dirt, dust or moisture prevail.

What are *your* tough lubricating jobs...where *ordinary* greases take a beating? Try greases fortified with Dixon *Natural* Graphite. Then see the big improvement!

Why? Because greases combined with Dixon *Natural* Graphite provide outstandingly effective lubrication *under even severest conditions* ...where dirt and dust abound; rain and moisture; high pressures; temperature extremes; shock loads.

Dixon *Natural* Graphite is practically indestructible. It withstands extremes of heat and cold. It is insoluble. Inert, it is unaffected by acids and alkalies. Processed under closest laboratory control.

What is your toughest lubricating problem? **Tell us the full particulars... our technical department will analyze your problem and send you specific recommendations and a sample of the proper Dixon lubricant. No obligation. Write, Joseph Dixon Crucible Co., Jersey City 3, N. J.**

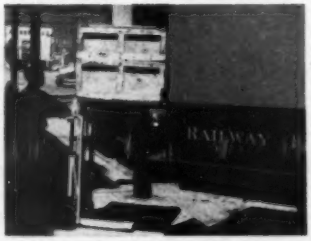
DIXON
NATURAL GRAPHITE

water line, or by a pressure controller actuated by the suction pressure. Controller is further described in Apparatus Bulletin G-180. *Johnson Service Co., 507 E. Michigan, Milwaukee 2, Wis.*

CONTROL INSTRUMENT—The Tel-O-Set Controller is designed to provide sensitive, instantaneous and accurate control of flow, temperature, pressure, liquid level and other industrial process variables. It's described as a low cost, easily installed, compact unit. In addition to its sensitivity and rapid response to process change, the controller operates on a pneumatic balance principle to eliminate friction and lost motion.

Latest of company's series of new devices designed to improve process control, this controller was developed for use with the other three: a differential converter, indicator and recorder. The new controller is made in two types, one with fixed proportional band, the other with adjustable proportional band. The units are made of a number of coded, interchangeable sections separated by diaphragms. Except for manual adjustments of reset on the band unit, controllers operate wholly in response to pneumatic signals. *Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa.*

HYDRAULIC LIFT TRUCK—The Model 14 Big Joe, the compact, all-purpose lifting unit pictured, is designed for one-man operation and will lift a 750 lb load to a height of 52 in. It is hydraulically operated by a foot lever. Suggested for stacking drums, handling dies and other heavy loads, the Model 14 is equipped with a safety brake and extension plates for bulky loads. The unit costs $236.50. More information about what it can do is given in bulletin available from manufacturer. *Big Joe Mfg. Co., 184 N. Franklin St., Chicago 6, Ill.*



MOTOR STARTERS—Types RAR and RAS extend the scope of company's RA line of magnetic starters to include reversing and multi-speed motors. The RAR (reversing) and RAS (multi-speed) feature company's "right angle" operating mechanism and are announced as offering greatly reduced size and weight with increased efficiency, straight-through front wiring, and more complete protection of electromotive equipment.

The starters are supplied in sizes 0,

USE

Koiled Kords

ON

ELECTRICALLY OPERATED *PORTABLE TOOLS... MACHINES THAT MOVE*

See how Koiled Kords eliminate dangling, catching, kinking cords on this job. Look over your plant and see the many places you can use these retractile kords that extend to five times their retracted length.

Jacketed in long-wearing neoprene, Koiled Kords may be ordered in standard lengths or made to your specifications.

Write for Koiled Kord bulletin showing their many uses.

IN STRAIGHT CORDS

DYNAPRENE IS BEST

Where retractile kords are not required use DYNAPRENE straight cords. DYNAPRENE is tough and resistant to abrasion, light, grease and other destroyers of older type cords.

Be sure to specify Whitney Blake type SO or SJO for flexible cord satisfaction.

Write for descriptive DYNAPRENE bulletin.

Koiled Kords

Box K New Haven 14, Conn.

Canadian Koiled Kords Distributor: R. D. Flock & Co. Ltd., Oshawa, Ont.

What other control center gives you this

TESTED PROTECTION

Your control center holds the life line to your motors. Such guardianship demands top-quality construction, at *every* point, to provide complete protection.

Westinghouse Control Centers are built to give you this protection and laboratory tested to prove it:

1. **Complete Baffling** of each starter unit in Westinghouse Control Centers is a typical example of the fruits of this thorough testing at the Westinghouse High Power Laboratory. When interrupting a short circuit on a starter unit of non-baffled design, tests showed the short circuit could spread throughout the entire structure. Each Westinghouse starter unit is completely baffled to prevent these explosive chain reactions. Unusual arcing is localized if faults occur.

2. **Ample Interrupting Capacity** is another tested feature of Westinghouse Control Centers. Each starter circuit breaker has a capacity of interrupting a fault current of not less than 15,000 RMS amps.

3. **Sturdy, Self-Supporting, Tight Structures** also are on the list of Westinghouse quality features. Each panel is built to stand by itself and to protect the internal electrical equipment.

You will want to know of the many other points of quality that make up Westinghouse Control Centers. Write for your copy of Booklet B-4213 which contains all the facts. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-27010

What Other Drive Gives You...
1. HIGH STARTING TORQUE
Smooth... positive... powerful — that describes a Duplex Steam Engine starting under full load. No clutch — no gear shift — no torque converter... just steady, continuous, direct power as your load comes up to speed — as slow or as fast as you require.
Plus
2 UTMOST FLEXIBILITY
3 SIMPLICITY, LONG LIFE
4 ACCURATE, FAST SPEED CONTROL
5 BY-PRODUCT POWER

Up to speed without a falter: This 300 hp. Troy Duplex Steam Engine brings a positive displacement blower up to speed smoothly, dependably, without jolts or surges. The constant torque characteristic of the engine is also ideally suited to this load.

Which Do *You* Need?

If your drive needs any or all of these five characteristics, the modern Troy Steam Engine is indicated. Send us your drive requirements and steam conditions, and our engineers will be glad to recommend the right type and size Troy engine to meet your needs.

Send for Bulletin 306

TROY

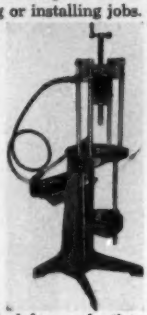
Troy Engine & Machine Co.

Power Equipment Division

809 RAILROAD AVENUE • TROY, PENNSYLVANIA

1, 2, 3 and 4. NEMA Type 1 steel housings are available for general indoor use; NEMA Types IV, VII and IX housings are also supplied to adapt the new starters to use in many exposed and hazardous locations. *Industrial Control Div., The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn.*

PEDESTAL PRESS—This press is offered for use with manufacturer's 17½ ton Power-Twin Hydraulic Puller which is designed to perform 95 per cent of the customary pulling or installing jobs. Mounting a strong, practical open-throat press plate it provides almost unlimited vertical adjustment and can be used for pulling wheels, pulleys, bushings, collars, couplings, gears, shafts and bearings.

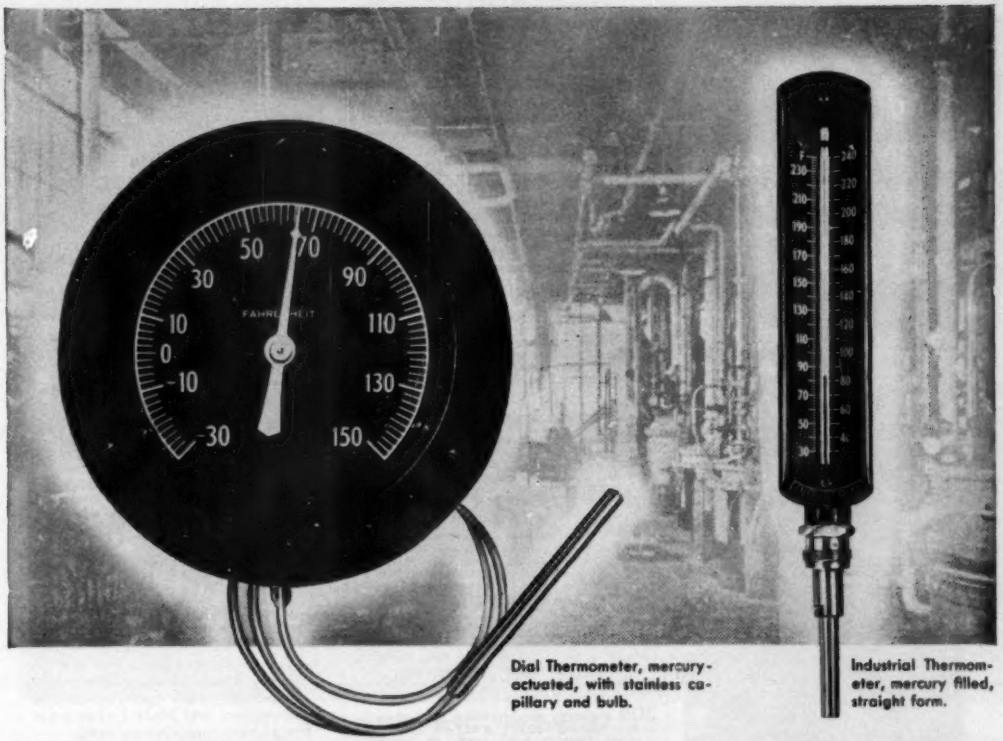


The press is portable and compact, its base being only 20 by 21 in., and it's highly practical for production, assembly line or maintenance operations. It may be temporarily or permanently installed near permanent equipment to perform pulling jobs.

The Model OTC-102 includes pedestal and press frame; accessories are available for practically any type of job. *Owatonna Tool Co., 446 Cedar St., Owatonna, Minn.*

SIMPLIFIED VENTILATOR—The Whirlout, a powered roof ventilator, is of the "straight-through" type and features simplified design and low over-all height. It is "open" only when its propeller fan is operating, the air stream being utilized to open and hold two semi-circular halves of the damper while forcing unwanted elements out of the building. A streamlined fan ring directly above the square-tipped blade propeller guides the airstream smoothly without back-flow. Available in a wide range of sizes and capacities, the Whirlout is said to be weathertight at all times. Ventilator is described in Bulletin 346. *The Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.*

ALL-PURPOSE LUBRICANT—Produced in grades from No. 00 to 3, Multiplex Lubricants are made with a bodying agent to give them stability under all service and storage conditions. They're suggested for use on water pumps, wheel bearings, industrial equipment. These lubricants are said to have no melting point under all temperature conditions normally encountered and to retain lubricity and adhesive characteristics. While insoluble in water, they absorb moisture while in service without losing adhesive or lubricating qualities, manufacturer points out, suggesting their use wherever water or moisture is a problem. *Hood Refining Co., Greensburg, Pa.*



Dial Thermometer, mercury-actuated, with stainless capillary and bulb.

Industrial Thermometer, mercury filled, straight form.

WILL THEY STAY HONEST WHEN THE HEAT'S ON?

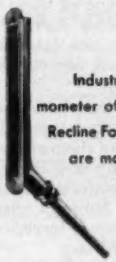
Rigid quality control and thorough testing of every USG Thermometer under actual operating conditions say *they will!*

So does the fact that USG sells no makeshifts. Regardless of your process or application, there's a USG Thermometer that suits it precisely. You may choose Industrial Types in all sizes, and mounting forms with standard or protected stems —or Dial Types in a variety of sizes, case styles, mountings, ranges and connections. *All* USG Thermometers—gas, mercury, or vapor-actuated—are built to the same high quality standards as USG Pressure Gauges!

If you're interested in typical applications of commercial and approved Navy Standards, dimensional information and the use of bushings, flanges, sockets and special tubing, send for Catalogs 100 and 200.

Special thermometers for dough testing, milk testing, fuel gas, candy, solder baths, varnish, canning, vulcanizing and other unusual processes.

Dial Thermometer with bottom-connected rigid stem, one of many USG types available.



Industrial Thermometer of the 45° Recline Form. There are many other standard forms.

UNITED STATES GAUGE

United States Gauge
Division of American Machine and Metals, Inc.
Sellersville, Pa.
Gentlemen: We are interested in USG ☐ Industrial Thermometers; ☐ Dial Thermometers. ☐ Please send us your catalog. ☐ Have your man call. No obligation, of course.

Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____

SLY

PIONEERS AND LEADERS IN

DUST CONTROL

WE CAN SAVE YOU MONEY BY COLLECTING YOUR DUST

Are you one of those who is still just *enduring* dust? If you are in dust, why not let a trained and experienced Sly engineer suggest a solution?

In *your particular industry* we have numerous operating installations. All of them are *saving* money for their owners–in cleaner plants, cleaner products, better personnel relations. Some of them are even *making* money by recovering valuable products.

With thousands of installations throughout the past 50 years, we have a wealth of experience in all industries. It is an exceptional background of value to anyone with a dust problem.

Yet—Sly costs *no more* (sometimes *less.)* May we send Bulletin 98 and discuss your dust problem with you?

THE W. W. SLY MANUFACTURING CO.

4600 Train Avenue • Cleveland 2, Ohio

New York • Chicago • St. Louis • Philadelphia
Minneapolis • Birmingham • Cincinnati • Lansing
Los Angeles • Rochester • Toronto

DATA FILE

of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to aid plant engineers in maintaining a permanent, up-to-date data file. For copies of these, write the number preceding the desired bulletin on the card in the heavy insert, pages 45-46 and 111-112.

CONSTRUCTION

201 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instrutcions. Tar Products Div., Koppers Co., Inc.

202 Building Panel Engineering Data—This 40-pp reference book on use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Fenestra Building Products Co.

203 Glass Block and Where to Use It—This 32-pp book gives design data, information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.

204 Technical Data on Plexiglas—This is a file folder of information on Plexiglas sheets, rods, molding powders, covering workability, properties, thicknesses. Discusses large area lighting. Rohm & Haas Co.

205 Building Construction and Maintenance Manual—Here's a 112-pp illustrated manual packed with facts on concrete and wood floor treatments, paints, protective coatings, concrete and mortar admixtures, waterproofing and dampproofing, caulking compounds, and roof coatings. Provides estimating guides on floor treatments and roof coatings, brick requirements, timber requirements and watercement ratios. L. Sonneborn Sons, Inc.

206 Technical Manual on Plywood—Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

MAINTENANCE

208 Drip Preventive Handbook—Insulation of pipelines, tanks, cold air conditioning ducts and wall surfaces against corrosion and condensation drip is covered in pocket-size 32-pp Form F-17. Describes coatings, tells how to apply. Includes coverage tables. J. W. Mortell Co.

209 Aluminum Building Sheet—Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, comprehensive flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.

210 Iron Cement Handbook—This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

211 Building Maintenance—Handbook 7 offers 64 pp of information on floor sur-

Keller Air Hoist with pendent control handles bar stock in steel warehouse

KELLER AIR HOIST for CONVENIENCE

The Keller Air Hoist is another "hand"—a powerful hand that picks up 300, 1000, or 2000 pounds—almost without human effort. Its variable speed lifting with pendent control gives the operator utmost convenience and control when handling heavy materials or parts.

Keller Air Hoists have other advantages, too, such as light weight (30 lb*), small size (5" x 5" x 15"*), safety, and low maintenance.

*for 1000-lb Hoist. Capacities of 300 and 2000 lb are also available.

Air Hose Trolley

Keeps air hose conveniently suspended, permitting it to follow a trolley-suspended Keller Air Hoist.

Keller Air Hoists, Hoist Trolleys, and Hose Trolleys are available through Keller sales offices, or direct from the factory.

KELLER

Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

After making competitive tests... this company selected

KOPPERS PROTECTIVE COATINGS

Warehouse of the Charles C. Lewis Company, Springfield, Mass.

● When it comes to choosing protective coatings, the Charles C. Lewis Company takes no chances. Before selecting the coating to be used on its new warehouse, four different coatings were tested—all made by reputable manufacturers.

Koppers Coatings won in a walk—not only did they provide more effective protection, but they cost *less* to buy and apply. So the cinder block concrete wall of the warehouse—12,000 square feet in all—was covered with Bituplastic® No. 28, over a prime coat of Bitumastic® Black Solution.

That was more than two years ago. Today, the cinder block is in excellent condition. There is not the slightest sign of any deterioration from the attacks of weather and corrosive industrial atmospheres.

For protecting concrete, masonry or metal, Koppers Coatings are effective and economical. For the full story, send for your free portfolio of booklets on corrosion prevention.

Here's why Bitumastic Coatings give lasting protection against corrosion and deterioration of metal, masonry and concrete:

● **Koppers Coatings, unlike maintenance paints, are specially formulated from a tar-pitch base* that is, for all practical purposes, impervious to water.**
● **Koppers Coatings provide a tough, impenetrable barrier to corrosive elements.**
● **Koppers Coatings provide up to 8 times the film thickness of conventional paint coatings.**
● **Koppers Coatings stop corrosion caused by moisture . . . acid fumes . . . alkaline fumes . . . corrosive soil . . . salt air . . . heat.**

**Hi-Heat Gray contains heat-resistant metallic base.*

Koppers Company, Inc.
Tar Products Division, Dept. 1123-T
Pittsburgh 19, Pa.

Please send me without charge or obligation, your booklets on corrosion prevention.

Name .....

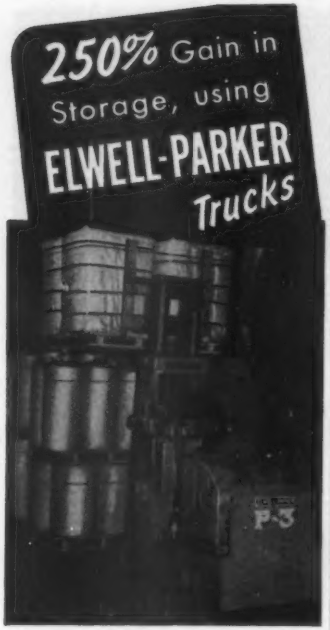
Address .....

City ..... State .....

KOPPERS **BITUMASTIC** PROTECTIVE COATINGS
REG. U.S. PAT. OFF.

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 1123-T, Pittsburgh 19, Pa.
DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH AND WOODWARD, ALA.



High tiering eight palletized rolls

● At a prominent textile finishing plant, Elwell-Parkers high stack 54 palletized rolls of cloth in the space previously occupied by 15.

Carloading Time Cut from 28 to 1½ Man-Hours—At this same plant, it formerly took 3½ hours for 8 men with hand trucks to load a boxcar. Now, the E-P truck operator with one helper does job in 40 minutes *—only 5% of previous man-hours!*

In over 300 different industries, Elwell-Parkers are saving vital man-hours and speeding production. To meet every need, there are 87 models, both battery and gas powered.

FREE BULLETIN

on Scientific Materials Handling. Ask for "Industrial Logistics" and name your product. Write The Elwell-Parker Electric Company, 4179 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
Power Industrial Trucks
Since 1906

facings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

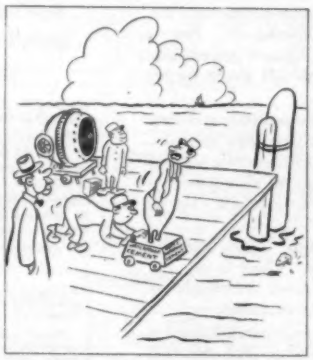
212 One-Coat Insulation — This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from —40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply, discusses K factor, bonding properties; describes specific uses—tank surfaces, heat ducts, metal surfaces of large buildings. Insul-Mastic Corp. of America.

213 New Floor in Minutes — This folder describes an instant-use, ready-mixed plastic patching or resurfacing material which can be applied after wire-brushing broken concrete or worn portion. Dura-Tred Co.

214 Floor Maintenance—This 12-pp brochure presents a complete and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing, waxing, and painting of concrete floors. The Tremco Mfg. Co.

215 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

216 For Floors That Take Beatings—Twelve-pp illustrated booklet, "Why Engineer an Industrial Floor," points out why installation of industrial floors for maximum life and minimum cost is a task requiring experienced planning, skilled execution and exacting cost control. Describes how floors can be engineered to withstand moving and deadweight loads, shock and vibration, extreme temperatures, oils, greases, chemicals and industrial wastes, etc. Flash-Stone Co., Inc.



"Couldn't we just test it in the laboratory, Mr. Guff?"

217 Why Good Cement Floors—Importance of quality concrete floors and factors involved are explained in this 8-pp bulletin. Discusses installation procedure and maintenance of company's cement flooring, its durability, other advantages, use for resurfacing as well as for new installations. Kalman Floor Co., Inc.

PUMPS, COMPRESSORS

220 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance time table. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

MERCOID

THEY ARE USED FOR THE CONTROL OF TEMPERATURE, PRESSURE, LIQUID LEVEL AND MECHANICAL OPERATIONS.

THE MERCURY SWITCH IS A FEATURE IN MERCOID CONTROLS. THE REASON FOR THE MERCURY SWITCH IS THE ADDED SAFETY, BETTER PERFORMANCE AND LONGER CONTROL LIFE—ALL OF WHICH ARE IMPORTANT WHEREVER CONTROLS ARE REQUIRED. WHY CONSIDER LESS WHEN YOU CAN GET SO MUCH MORE.

WRITE FOR COMPLETE CATALOG

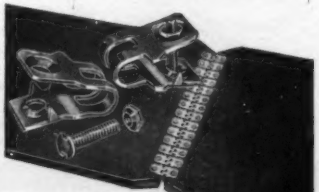
THE MERCOID CORPORATION
4201 BELMONT AVE. CHICAGO 41, ILL.

HINGED PLATEGRIP
BELT FASTENER No. 500
FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from ⅜" to ½" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular



ARMSTRONG-BRAY & CO.
5398 Northwest Highway CHICAGO 30, U. S. A.

WESTON *Readable* ALL-METAL THERMOMETERS

—AVAILABLE IN THESE 3 TYPES

STANDARD INDUSTRIAL THERMOMETERS

All-metal dial types with stainless steel stems, in straight and angle forms. Scale lengths 3"—6" and 9", with stems from 2½" to 72". Available as testing thermometers, and for general purpose and heavy duty service. Ranges from −100 to +1000°F. All-metal construction prevents breakage, assures dependable accuracy for longer periods.

CONTACT MAKING THERMOMETERS

Combines the features of the all-metal indicating thermometer with an alarm or control device. Has adjustable contact arm mounted in the glass and bezel. Supplied to make contact on increasing or decreasing temperatures. Has positive magnetic type contacts. Contact rating . . . 100 ma at 110 volts a-c; 50 ma at 110 volts d-c. Stem lengths 2½" to 24".

MAX-MIN THERMOMETERS

Equipped with a manually set red index which moves up or down scale with pointer, remaining at extreme temperature reached until reset. Thus one reading gives present temperature, and maximum or minimum reached since last reading. Available in scale lengths of 6" and 9"—stem lengths 2½" to 24"

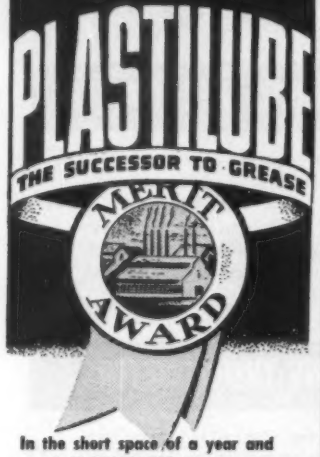
Literature describing Weston all-metal, as well as electrical and glass thermometers, sent on request. WESTON Electrical Instrument Corporation, 624 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAGliabue instruments.

WESTON *Instruments*

MERIT AWARD FROM INDUSTRY

PLASTILUBE

THE SUCCESSOR TO GREASE



In the short space of a year and one half, PLASTILUBE, "the successor to grease," has been industry's choice as a TRULY multi-purpose lubricant.

Over 2000 leading industrial concerns have tested and specified PLASTILUBE . . . have found that it out-performs any other single lubricant on the market . . . does a better specialized job than any special lubricant.

Check PLASTILUBE against the grease you're now using — for non-melting, non-bleeding, water resistance, adhesion and pumpability. You'll find there are very good reasons for industry's "merit award" to PLASTILUBE.

THE Warren REFINING & CHEMICAL COMPANY
CLEVELAND 15, OHIO

THE WARREN REFINING AND CHEMICAL CO.,
750 PROSPECT AVENUE, CLEVELAND, OHIO

Please send me full information about PLASTILUBE.

.....

.....

.....

221 Centrifugal Pumps — Single- and two-stage pumps for small boiler feed service, cooling tower service, bottle washing, brine circulation, general water service, hot well service are described in Bulletin W-306-B1. Includes ratings. Worthington Pump and Machinery Corp.

222 How to Solve Pumping Problems—Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction list and discharge head, determine direction of rotation and size of speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp.

223 Air Compressors — Twenty-pp Form 534, a catalog on air compressors, includes selector charts and case examples to facilitate choice of right model. Describes and illustrates single- and two-stage, vertical and horizontal types, also models for low pressure service. The Wayne Pump Co.

224 Multi-Stage Compressors — Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

225 For Abusive Pumping Jobs—Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pumps; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications, and a vertical shaft dry pit pump. Nagle Pumps.

226 Steam Heating Pumps—Twenty pp of information on vacuum and condensate pumps are presented in Bulletin 1401. Covers vacuum pumps from 2500 to 65,000 EDR, providing an illustrated description of vacuum pump operation, detailed data on working parts, a table showing standard air and water capacities, rating and testing procedures, diagrams of sample installations and dimensions. C. A. Dunham Co.

227 Rotary Pump Service Manual — Although written for users of company's own rotary pumps and including a parts list, this little 20-pp booklet contains tips on installation and care applicable to practically all pumps of this type. Covers mounting, pipe connections, suction lines, pipe sizes, strainers, discharge lines, power, relief valves, speeds. Provides pointers on no.sy operation, rapid wear, decreased capacity, loss of suction. Viking Pump Co.

228 Stainless Steel Pumps — Centrifugal pumps described and illustrated in 8-pp Bulletin 725.3 are designed for handling corrosive liquids. Pump design is explained and parts identified. Specifications, dimensions included. Goulds Pumps, Inc.

229 Condensation Return Units—Bulletin 113-ST describes and illustrates packaged condensation return units for small, low pressure uses, covering pump capacities of 1½ to 22½ gpm. Aurora Pump Co.

PACKINGS, SEALS

230 Data on Packings—Form 426 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Duralmetallic Corp.

231 Mechanical Seals for Rotary Shafts —Illustrated with cutaway drawings, this 12-pp booklet covers seals of the positive, chevron, and o-ring types, gives specifications. The Garlock Packing Co.

232 Packing Rings—Engineering data on company's Simsite Graphitic snap rings of non-metallic composition for packing liquid end pistons of reciprocating pumps is provided in illustrated Bulletin R112. Covers properties of Simsite, forms of packing spaces, ordering information needed, installation procedure. Sims Pump Valve Co., Inc.

233 Long Wearing Piston Packing — Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

234 Metallic Packing—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used in compressors, engines, pumps. A. W. Chesterton Co.

FUELS, LUBRICATION

235 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.

236 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricant requirements of equipment in 25 major industries. Lubriplate Div., Fiske Brothers Refining Co.

237 The Why, What and How of Lubricants — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

238 Lubrication of Refrigeration, Air Conditioning Equipment—Revised Technical Bulletin B-3 is a 56-pp illustrated manual filled with practical tips on good

ARMSTRONG BROS.
Better PIPE TOOLS

Reversible Ratchet STOCKS and Adjustable DIES

Exceptionally convenient where space is limited, this stock simplifies pipe threading close to walls, in corners and wherever operating room is restricted. With *adjustable* dies (cut exact, over or under size threads) it is an ideal tool where valves and fittings are being installed or maintained.

"ARMSTRONG BROS." Adjustable dies are of special Vanadium Tool Steel, have "backed-off" teeth, correct cutting angle, ample chip clearance and correct throat angle. They start and cut easily, hold their sharpness and "spin" off pipe without jamming or tearing threads.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5207 W ARMSTRONG AVENUE • CHICAGO 30, ILL.

—with bench and table tops of MASONITE TEMPERED PRESDWOOD

Small, lightweight items. Large, heavy pieces. They're all the same to dense, durable Masonite Tempered Presdwood®. This strong, tough panel material is friendly to men and materials, helps you boost production efficiency. Here's why:

1. Smooth, grainless surface has no cracks or crevices to catch small parts. Even heavy objects slide along easily.
2. Resists dents, bumps and heavy punishment.
3. Won't scratch highly polished parts.
4. Won't snag textiles, plastics, leather and other "soft" items.
5. Won't split, splinter or crack. Won't injure workers' hands.
6. No glare when used just as it is, or can be finished in eye-pleasing colors to increase visibility.
7. Resists moisture and many acids.
8. Dust can't hide! Easy to keep clean.
9. Warm to the touch. No "clammy" feeling.
10. Minimum joints. Comes in large panels up to 4 x 12 ft. Easy to cut and fit with ordinary tools.
11. Easily, quickly installed right on the job.
12. Combines long life and low cost.

You can profit by investigating the many in-plant uses for Tempered Presdwood, one of the 19 different types and thicknesses of Masonite Hardboard. Ask your building materials dealer. For complete information mail the coupon today!

Just a few of the ways MASONITE HARDBOARD boosts efficiency and morale:

- Bench and table tops
- Aisle runners and mats
- Washroom walls
- Cabinets
- Partitions
- Pallets and trays
- Tote trucks

MASONITE® CORPORATION
BOX 777, CHICAGO 90, ILLINOIS

"Masonite" signifies that Masonite Corporation is the source of the product

MASONITE CORPORATION PE-11
Box 777, Chicago 90, Illinois

Please send information about plant uses of Masonite Hardboard.

Name.....

Address.....

City and Zone.....State.....

DURAMETALLIC

Packings

For over thirty years, custom-built types and styles of Durametallic Packings have been serving the various stuffing box requirements of industry.

Durametallic Sales and Service is nation-wide. Submit your sealing problems to us for free counsel.

Durametallic Corporation

KALAMAZOO, MICHIGAN

TAC does what no other tool can do!

AT LAST! AN OPEN-END RATCHET WRENCH — the world's first true *universal* wrench. A patented design for connections on tubing, rods, piping, conduit, studs, etc. Sixty-four socket sizes from ⅜" to 4". Smallest effective ratcheting arc yet — 5° to 7½°. TAC will also do every job ordinary ratchet wrench will do: one TAC set replaces literally dozens of single-purpose hand tools.

makers of advanced tools for industry

TAC

TUBING APPLIANCE CO.

7112 South Victoria • 10321 Anza Ave. • Los Angeles, Calif.

lubrication practice for both large systems and small units. Discusses types of refrigerating systems, functions of essential parts, characteristics of refrigerants, effect of refrigeration on oils, lubrication recommendations and the applications of refrigeration. Covers selection of oil and gives instruction on lubrication of compressors, bearings, air conditioning equipment. Sun Oil Co.

239 **Cooperative Technical Consultation Service**—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

240 **More Work per Drop of Oil**—Illustrated Form 425 introduces company's Micro-Fog, an improved lubricator designed to offer more thorough lubrication, reduced maintenance. C. A. Norgren Co.

INSTRUMENTS, CONTROLS

242 **Industrial Control Devices**—Catalog 8303, 84 pp, presents 100 models of non-indicating electric, electronic, and pneumatic controllers for flow, pressure liquid level and humidity applications. New instruments shown include electronic temperature controllers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

243 **Handbook on Automatic Controls**—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure-low water, liquid level, boilers; tranaformer-relays, control valves, mercury switches. The Mercoid Corp.

"Jones just went home, said you told him to beat it."

244 **Electrical Instruments** — A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters, matched a-c and d-c portable instruments, also current transformers, light meters. Weston Electrical Instrument Corp.

245 **Time Saving Volt-Ammeter**—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.

247 **Wide Range Regulator**—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works, how it is easily changed from direct-acting to reverse-acting instrument. The Powers Regulator Co.

VENTILATING, AIR CONDITIONING, DUST CONTROL

248 **Dust Collectors** — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk and Blum Mfg. Co.

249 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

250 Improved Air Conditioning—Advantages and applications of a controlled humidity method of air conditioning are discussed in Bulletin 112. Process is explained, illustrated. Niagara Blower Co.

251 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

252 Dust Precipitators—Twelve-pp Bulletin 1728 covers manufacturer's latest design of dust precipitators, a line designed to handle fly ash, cinders and industrial dusts, to meet the need for a compact, simple, economical all-purpose mechanical type unit. Includes performance and efficiency curves. American Blower Corp.

253 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hasard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency. Buell Engineering Co., Inc.

254 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Discusses control of air movements, recommended hood and enclosure design, exhaust air velocity and volume and rules for installing system piping. Pangborn Corp.

255 Wet Method Dust Collection—Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 20-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function operations, settling and dewatering equipment, also pumps and separators. Pictures and describes 24 installations. Claude B. Schneible Co.

256 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

257 Replaceable Air Filter—Introducing the Amer-glas filter, which comes in standard sizes for forced heating, ventilating and air conditioning systems, Bulletin 211 explains its operating principle, discusses its resiliency, efficiency and maintenance. American Air Filter Co., Inc.

258 Tubular Dust Filters — Advantages, uses and design of tubular dust filters are given in Bulletin 34-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers. Ruemelin Mfg. Co.

259 Heavy Duty Ventilation Filters — Form DPF-100.LH presents a dry panel filter with a filtering area of 23 sq ft. Tells features, uses; includes installation data, filter selection chart. Dollinger Corp.

HEATING

261 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.

262 Unit Heater Selection — Sixty-pp Bulletin DS-327B tells how to choose pro-

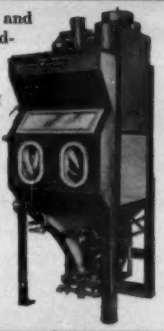
Here's BIG NEWS

Blast Cleaning Unit is PORTABLE!

Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from.....$170.00 and up

Hydro-Finish SPEEDS POLISHING!

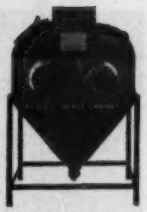
Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from $1295.00 and up



STOP DUST at the SOURCE!

Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from $286.00 and up

COMPACT Blast Cabinet for SMALL WORK!



Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from $315.00 up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Pangborn

MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....

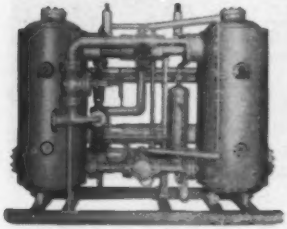
Company.....

Address.....

City.....Zone....State.....

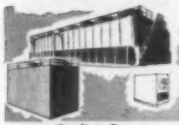
UNEXCELLED—
FOR DEHYDRATION
OF INSTRUMENT AIR!

The Quality
Pritchard HYDRYER*



The quality Pritchard HYDRYER* is *unexcelled* for dependable dehydration of air for instrument and process controls. Dual adsorbers provide continuous drying action. Standard packaged units designed to reduce dew points of compressed air or other gases to minus (—) 40° F. Only service connections are required. Specially designed HYDRYER* units can be tailored to your individual requirements. Investigate today!

*Registered Trade Name



Write Today for Bulletin No. 16.0.080

Producers of QUALITY Specialized Process EQUIPMENT

Cooling Towers
Gas & Air Treating
Specialized Heat Exchangers

J.F. Pritchard & Co.
EQUIPMENT DIVISION
Dept. No. 214 908 Grand Ave., Kansas City 6, Mo.

District Offices: CHICAGO • HOUSTON • NEW YORK • PITTSBURGH
TULSA • ST. LOUIS Representatives in Principal Cities from Coast to Coast

Will The Impeller Handle Your Job?

IT WILL if it's job-specified by Nagle . . . And at less cost per gallon or pound of material handled! Nagle impeller design holds sharp re-entrant angles to a minimum, cuts individual points of wear. You'll minimize stuffing box troubles, too, with relief holes that place the stuffing box in communication with lowest pressure area of the impeller. Face seals cut efficiency loss from internal leakage and protects the stuffing box from grit. This important attention to design details is found throughout every Nagle Pump—your assurance of longer pump service at less costs. If you have an abrasive or corrosive pumping problem, get the complete Nagle story!

Nagle Pumps, Inc.
INDUSTRIAL PUMPS FOR ABUSIVE APPLICATION
1261 CENTER AVE. CHICAGO HEIGHTS, ILL.

peller-type unit heaters, where to locate them and how to install them. Shows how manufacturer's heaters are constructed. Covers heaters for ventilation with duct work, piping details, controls, maintenance tips, steam and hot water capacities. The Trane Co.

263 Heat-Transfer Equipment—An excellent source of information on shell and tube heat transfer equipment. 28-pp Catalog DM-1150 covers heat exchangers, tank suction heaters, oil preheaters, condensers, evaporators, after-coolers, gas coolers, centrifugal pumps and water heaters. Instructions for installation, operation and maintenance are included. Bell & Gossett Co.

"Certainly, our steam is fresh . . . made this morning . . . the odor couldn't be coming from your radiators."

264 How to Save Waste Heat—The utilization of unit heaters for recovery and distribution of waste heat from engine and compressor jacket water is covered in 4-pp Form 00531A. Method of using waste heat to lower space heating costs is explained. Several installations are detailed to illustrate piping hookups, control methods. Modine Mfg. Co.

265 Heating Equipment and Systems—Sixty-pp Catalog G-99 presents up-to-date ordering information on company's heaters and hot water heating specialties, also design tables and engineering data for venturi systems, two-pipe reverse return systems, panel heating systems, snow melting systems. Contains a parts list and section on servicing of circulators, valves, flow checks. Includes a check chart providing basic remedies for common hot water heating and indirect water heater complaints. Taco Heaters, Inc.

PIPING, VALVES, TRAPS AND FITTINGS

267 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.

268 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

269 "Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

270 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculations, selection data on

traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

271 **How to Choose and Use Air Traps**—Bulletin 202 describes air trap selection and installation for automatic drainage of moisture from compressed air intercoolers, aftercoolers, receivers, separators and drip points. Armstrong Machine Works.

272 **Strainers and Separators** — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co.

273 **Unions and Fittings** — Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. Describes special construction features. E. M. Dart Mfg. Co.

274 **Safety Head Catalog**—Section 10, Part 1 of Catalog 54, 52 pp, contains charts and tables covering almost any phase of safety head information. Tells where safety heads can be used and how to use them. Gives advantages of manufacturer's line in protecting pressure equipment. Tells how to choose safety head assemblies and rupture discs. Includes tips on lowering temperature at point of safety head location. Black, Sivalls & Bryson, Inc.

275 **Solving Steam Trap Problems**—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

276 **Handbook on Fittings, Flanges** — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

277 **Steam Trap Reference Manual**—A lot of application and selection information on steam traps is packed into 24-pp Bulletin T-1740. Tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Also provided are installation and operating tips, prices. Yarnall-Waring Co.

278 **Threadless Bronze Fittings**—A fitting designed to improve copper and brass piping is described in this illustrated bulletin. This is a threadless bronze fitting with brazing alloy (company's Sil-Fos) incorporated as a ring in the port openings. Strength, other advantages of the resulting joint are described; procedure for making this joint is pictured. Walworth Co.

279 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures to 1500 lb; piston-operated steam traps, also separators. W. H. Nicholson & Co.

280 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.

281 **Forged Steel Valves**—Form 800-A illustrates and describes 600-lb forged, steel valves for high line pressure and temperature applications, giving dimensions, prices. The Ohio Injector Co.

282 **Pipe Couplings, Joints** — Composite Catalog 50 illustrates more than 500 ball-bearing swivel joints for temperatures

A WONDERFUL NEW PRODUCT THAT COMPLETELY

AN ENTIRELY NEW CONCEPT IN BELT DRESSING

Chesterton Belt-Flo is a new liquid belt dressing that contains neither rosin nor asphalt. It will not pick up dust or dirt. It will increase transmitted horsepower up to 50%! It never builds up on belts.

"Belt-Flo" holds its power because it does not harden. Is applied to running belts through applicator spout. Colorless — Nontoxic.

"Belt-Flo" ideal for use on Leather, Rubber or V Belts.

Carried by all leading Industrial Supply Jobbers. Order today and experience an entirely new concept in belt dressing that ends belt slippage . . . for ever!

Chesterton Belt-Flo

PACKING Chesterton SERVICE

A. W. CHESTERTON CO.
6 Ashland St., Everett 49, Mass.

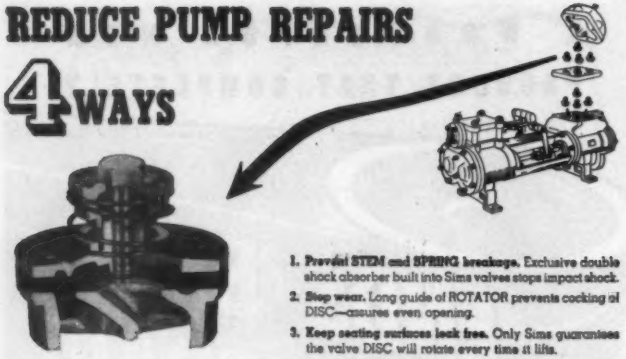
☐ Please send me more information about Belt-Flo.
☐ Who is my local distributor?

Name_____ Company_____

Street_____

City_____ State_____

REDUCE PUMP REPAIRS 4 WAYS



1. **Prevent STEM and SPRING breakage.** Exclusive double shock absorber built into Sims valves stops impact shock.
2. **Stop wear.** Long guide of ROTATOR prevents cocking of DISC—assures even opening.
3. **Keep seating surfaces leak free.** Only Sims guarantees the valve DISC will rotate every time it lifts.
4. **Stop valve slam and knock.** Quiet operation is gained by cushioning moving parts and cutting resistance to flow through the SEAT ... with patented **inclined ribs.** This reduction of resistance allows cylinders to fill completely. Pump capacity is increased 20%.

Sims valves are made in sizes from 2¾" to 15¼" to fit any reciprocating pump. Valves supplied ready to install—cast in individual units or in complete plates.

SIMS PUMP VALVE CO., INC.

New catalog shows how Sims valves fit any pump—how they work—efficiency and comparison charts. Send for your free copy today.

145 HUDSON ST., NEW YORK 13, N. Y. • M & M BLDG., HOUSTON, TEXAS

THE HALLOWELL® WORK BENCH OF STEEL

Standardized, ready-made HALLOWELL Work Benches save trouble and expense of "building your own"; provide superior equipment for maximum productivity.

Interchangeable units readily adaptable to individual requirement. Easily bolted together to form continuous bench, yet may be taken down and reassembled as single units. Rigid, heavy-duty construction eliminates bolting to the floor, minimizes installation and maintenance.

HALLOWELL Work Benches do credit to any plant. Functional design and attractive appearance encourage better plant housekeeping and worker performance.

Full details in Bulletin 701.

SHOP EQUIPMENT HALLOWELL® OF STEEL

Ready-Made, Standardized

SPS STANDARD PRESSED STEEL CO.

JENKINTOWN 26, PENNSYLVANIA

from -25 F to 600 F and pressures from vacuum to 15,000 psi in sizes from ⅛ to 12 in. Chiksan Co.

ELECTRICAL

288 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contractors; synchronous and high voltage starters; d-c control relays, contactors, starters; drum switches, a-c d-c rheostats, speed regulators; push buttons, limit switches, and accessories. Allen-Bradley Co.

289 Motor Handbook—Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

291 Precision Switches—Twenty-pp Catalog 81 covers industrial switches for a-c circuits. Describes general purpose basic switches, auxiliary actuators, enclosed, explosion-proof and splash-proof types, limit switches, small switches. Includes technical technical data, prices. Micro Switch.

292 Electric Motor Lubrication Studies—Bulletin 1579 shows comparative amounts of lubricant in different designs of bearings, how bearings are subject to air circulation. Explains company's Lubrifluah principle. U. S. Electrical Motors, Inc.

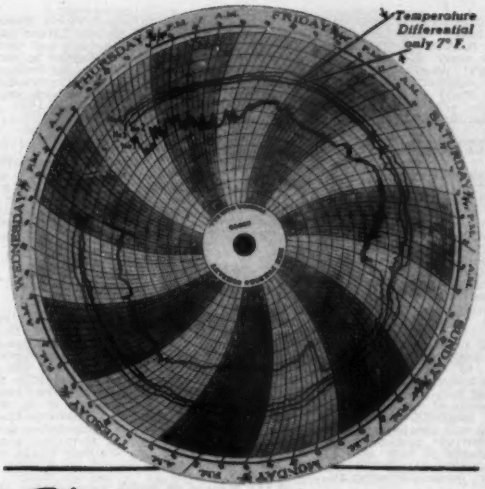
293 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also strap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

294 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, lighting systems, etc. Tells where bus duct can be used to advantage. Company's line of bus duct is shown and dimensions given. Also presented are overload protective units. A technical section gives tables and formulas useful in applying bus duct correctly. Westinghouse Electric Corp.

"Now where did I get in to rebrick this firebox?"

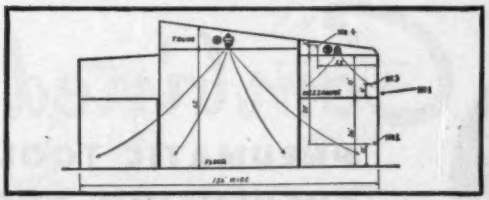
295 Distribution Duct Engineering Data—Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating, diagrams, layout symbols. BuliDog Electric Products Co.

296 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists,



The Story of the TEMPERATURE CHART

Replacing an expensive but inadequate heating system, Wing Revolving Unit Heaters completely solved a difficult heating problem in a shipbuilding plant. The building is 156' wide by 62' to the cross beams by 802' long. A mezzanine is 42' by 21' to the cross beams by 802' long.



Ten Wing Revolving Unit Heaters with one-way discharges cover the section marked "A" on the diagram. Ten smaller Wing Revolving Heaters cover the mezzanine section marked "B". Fairly high working temperatures (75° F) were required. The chart from a recording thermometer with bulbs located as shown, reveals graphically the working temperatures, the relatively low ceiling temperatures and the fluctuating outdoor temperatures (32° to 75° F) over one week's time.

Write for further details and a copy of Bulletin HR-6.

L. J. Wing Mfg. Co., 177 Vreeland Mills Rd., Linden, N. J.
Factories: Linden, N. J., Montreal, Can.
In Europe: Etab. WANSON, Brussels, Belgium

Wing REVOLVING UNIT HEATERS

This big 48 page catalog... READY FOR ENGINEERS and CONTRACTORS

BARBER COLMAN

See SPECIAL SECTION ON HOT WATER CONTROLS Pages 35-39

Barber-Colman Company has literature available on a wide list of Controls and Air Distribution products. We will be glad to send you a check list for indicating literature that you may wish to add to your library.

Send for your copy of "Controls for Heating and Air Conditioning" today. Here in one compact, clearly indexed catalog is all the information you need on Barber-Colman thermostats, motor-operated valves, control motors, and accessories.

Packed with data, details, dimensions, illustrations, and graphs, this new handy book will make your selection easier, faster! Put it with your reference books . . . use it in the field . . . get copies for your staff. You can rely on the data you'll find in this Catalog, for like all Barber-Colman specifications and recommendations, it is *Engineer-proved.*

Use the coupon below:

Gentlemen:
Please rush.....copies of your new 48-page Catalog "Controls for Heating and Air Conditioning."

☐ Also send me latest Check List for requesting additional literature on Barber-Colman Controls and Air Distribution products.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....STATE.....

BARBER-COLMAN COMPANY
1237 ROCK STREET • ROCKFORD, ILLINOIS

cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

297 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

298 Weatherized Motors—Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.

299 Circuit Breaker Reference Data—Catalog Section 5000 is a collection of more than 30 data sheets providing selection and application information and ordering instructions for company's molded case circuit breakers. Fully illustrated, includes ratings, current carrying capacities, dimensions, prices. I-T-E Circuit Breaker Co.

300 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Gives standard reel sizes and capacities, standard specifications. Rome Cable Corp.

301 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to 3 times retracted length. Koiled Kords, Inc.

302 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair; technical data. Fully illustrated, also catalogs battery parts, tells how to order them. Gould-National Batteries, Inc.

LIGHTING

304 Industrial Lighting at Work—Sixteen pp Booklet B-4727 stresses three ways of putting better lighting to work: cutting costs by promoting more production; increasing efficiency by ensuring accuracy, and reducing accidents by exposing dangerous operations. Analyses mercury vapor and incandescent light sources as to efficiency, service life, maintenance, mounting height and job suitability. Luminaires of each type are pictured; wattage and lumen output ratings. Westinghouse Electric Co.

305 Recommended Lighting Systems — This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels of 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Also discusses supplementary lighting. Lamp Dept., General Electric Co.

306 Plant Lighting Planning Guide—This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Co.

307 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

COMMUNICATION

308 Plant Communication Systems—This 25-pp brochure describes a high and low level intercom system readily installed and permitting two-way conversations over close-speaking microphones and receivers as well as paging over loudspeakers suited to different noise levels. Gai-Tronics Corp.

MECHANICAL POWER TRANSMISSION

309 Helpful Data on Chain Drives—Compiled as a helpful data book, 32-pp Catalog HD-51 offers a simple, quick means of determining interchangeability of various makes of roller and conveyor chains. Also supplies information of value in determining proper application of chain drives as a power transmission or conveying medium. Describes and illustrates chain parts and types, provides comparative data, conversion tables, helpful formulas, trigonometrical functions. Whitney Chain Co.

310 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering, selection, ordering information; includes formulas. Dodge Mfg. Corp.

311 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

312 Handbook on Chains and Sprockets—An excellent reference book is 216-pp

Combined

PNEUMATIC TOOL SUSPENSION AND AIR SUPPLY

HOSE which supplies air suspends pneumatic tool directly over the work spot . . . always handy. Weight of tool is counterbalanced by spring tension of the reel. Releasing tool lifts it automatically to predetermined, convenient position. This simple device speeds up production, lessens fatigue, reduces tool maintenance cost, saves hose and eliminates accidents. No cable suspension necessary. There are no unsightly and dangerous loops of hose. Tension is easily changed. A completely packaged unit. Easy to install in any position. See your jobber or write today for more information.

Hose Reel Division

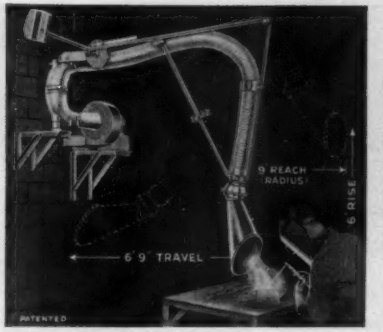
Wayne

THE WAYNE PUMP COMPANY • FORT WAYNE 4, IND. • TORONTO

A reel time-saver—tool is always at hand.

INDUSTRIAL HOSE REELS

FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS



RUEMELIN Fume Collector

Removes Welding Fumes at the Source...

Why continue to let your employees inhale welding fumes? You can solve the problem quickly and efficiently by installing a Ruemelin Fume Collector. It produces a powerful suction that draws out noxious gases, smoke and heat at the source. Guards employee health, resulting in less welder fatigue, therefore, greater plant output. Clears shop air with minimum loss of building heat. Covers maximum welding area vertically, horizontally and by circle swing. Shipped assembled, easy to install. 9 ft. and 15 ft. sizes (radius of swing). Write for Bulletin 37-D.

These Fume Collectors are particularly helpful in winter months when doors and windows are closed.

RUEMELIN MFG. CO.

3988 N. PALMER STREET MILWAUKEE 12, WIS., U. S. A.

MANUFACTURERS AND ENGINEERS — SAND BLAST AND DUST COLLECTING EQUIPMENT — WELDING FUME COLLECTORS

Let

BIG JOE

do it!

All Purpose Lift — Model 14
Capacity — 750 pounds
Lifting Height — 52 inches
Price — $236.50, F.O.B. Chicago

Ideal for stacking drums or loading and unloading heavy, bulky items from trucks, The Big Joe Lift has a heavy-duty hydraulic unit for fast action, and comes equipped with extension plates and a safety brake at no extra charge.

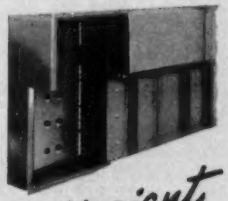
- **Efficient**
- **Indestructable**
- **Economical**
- **Indispensable**

IT'S ***NEW***

For free bulletin write or call . . .

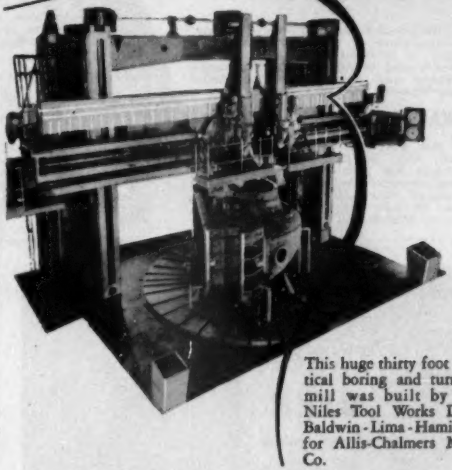
BIG JOE *Manufacturing Co.* * 188 N. FRANKLIN ST. CHICAGO 6, ILLINOIS

ELECTRIC FEEDRAIL®



Partial view of 79 pole, multiple conductor Feedrail trolley busway system that distributes current for power and control of this 30-ft. giant mill. Except for critical hand lever adjustments, all control is through buttons and selector switches located in remote dual console stations.

"Nerves" for a 30-ft. giant



This huge thirty foot vertical boring and turning mill was built by the Niles Tool Works Div., Baldwin-Lima-Hamilton for Allis-Chalmers Mfg. Co.

Giant thirty foot boring mills are not built every day. When they are, precision control is essential. A 79 pole multiple conductor Feedrail provides the "nerve system" for finger-tip control and dependable, unfailing power supply for this massive machine.

Every day Feedrail is solving power and control problems. Moving trolley outlets in an enclosed track roll with electric tools which must follow work. Power machines move in and out of work centers quickly, and produce more work in less time. Feedrail flexibility is engineered into standardizd units that assemble to give a "tailored to fit" power supply system. Write for literature.

Sold by leading electrical distributors.

46-C

Never Becomes Obsolete

ELECTRIC FEEDRAIL®

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET · NEW YORK 7, N. Y.

Catalog A412. Discusses various chains and their service applications, metals used in them, and factors affecting their efficiency. Gives selection information on chains for drives and for elevators and conveyors. Engineering data includes dimensions, strengths, weights. The Jeffrey Mfg. Co.

313 Manual on V-Belt Drives—Catalog 200 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. List prices, dimensions included, also a 12-pp supplement on cog belt drives. The Dayton Rubber Co.

314 Blocks and Sheaves—Catalog 300-24 24 pp, covers manufacturer's complete line of blocks and sheaves. Provides block number, capacity in tons, number of sheaves, rope size and weight of each block. Illustrations, ratio table and formula included in a section on figuring line parts. American Hoist & Derrick Co.

316 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

317 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliott Co.

MATERIALS HANDLING

319 For Efficient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.

"Smith, I've had reports you've been squeezing some of the tomatoes in your department."

320 Handling Equipment Ordering Book—Ninety-pp Catalog 23 describes power trucks, power jacks, stackers, cranes, hand trucks, platforms, storage racks. Fully illustrated. Lewis-Shepard Products, Inc.

321 All-Purpose Lifts—"Let Big Joe Do It" is a bulletin on hydraulic lifting units. Features a heavy duty model for lifting loads to 52 in. height. Big Joe Mfg. Co.

322 Handbook on Overhead Conveying Systems—Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering and application data. Richards-Wilcox Mfg. Co.

323 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions, operating advantages. Keller Tool Co.

324 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

325 Safe Truck Operation — "Safety Saves!" is a cleverly written 24-pp booklet setting forth "do's" and "don't's" established as a practical code of truck operation. The admonitions, presented in good-humored fashion, and pointed up by cartoons, are offered as both "refresher course" and fundamental text. Industrial Truck Div., Clark Equipment Co.

326 Data on Tramrail Equipment — Twelve-pp Form 2006F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

327 Conveying Systems Manual — Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin FK-25. Text covers system and operation; stationary pump, accessories. Fuller Co.

328 Electric Lifters—Medium and heavy-duty electric lifters are described and illustrated in Bulletin LU50. Company's ball bearing hoisting unit is discussed. Economy Engineering Co.

329 Conveyor and Elevator Belts—This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.

TAMP
←
TRUCK OVER
→
NO WAIT FOR DRYING

HERE'S THE QUICKEST, BEST WAY TO
PATCH BROKEN FLOORS

Use durable INSTANT USE . . . a tough plastic material which you simply shovel into hole — tamp — and run traffic over immediately. Tough INSTANT-USE is ideal for repairing cracks and breaks due to relocating machines . . . or for complete overlays. NOTE: Plasticizer makes INSTANT-USE easy to scoop out of container . . . easy to level, to tamp, to use! *There's a Flexrock material for every floor condition — oil, acid, wet, dry! Tell us your problem!*

MAIL COUPON for TRIAL OFFER and HANDBOOK OF BUILDING MAINTENANCE

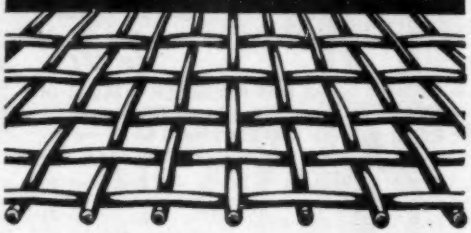
INSTANT-USE

FLEXROCK COMPANY — Offices in Principal Cities
3615 Cuthbert St., Phila. 4, Pa.

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and HAND BOOK OF BUILDING MAINTENANCE—no obligation. (Clip and attach Coupon to Co. letterhead.)

Name.....
Company.....
Address.....

CAL-WIC WIRE CLOTH



meets all STANDARD and SPECIAL requirements

Either as original equipment or for specialized uses in filtering, screening, grading, cleaning or processing, Cal-Wic Wire Cloth is available in the right weave, mesh and weight to give you long-wearing, dependable service.

Made in different types of metals and alloys for high resistance to chemical action, corrosion, abrasion and temperature extremes.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION – Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION – Oakland, California
WICKWIRE SPENCER STEEL DIVISION – Clinton, Massachusetts

CAL-WIC CFI
INDUSTRIAL SCREENS
THE COLORADO FUEL AND IRON CORPORATION

The "ECONOMIC" Boiler

ECONOMIC, the original combination of Boiler-Furnace and Refractory has brought economical steam generation to many thousands of small steam users. It's a rapid steamer—has large steam and water capacity—it's safe. Front and rear doors make it easy to keep tube interiors clean and efficient. There's nearly 75 years of constant improvement behind the Economic, and today it is fusion welded and X-ray inspected to eliminate riveted straps and seams. Write for Catalog SB-34.

ERIE CITY IRON WORKS • ERIE, PA.
1451 East Avenue

ERIE CITY

Complete Steam Generators • Type C 3-Drum Boilers • Type VL 3-Drum Boilers • The "Economic" Boiler with or without Water Walls • Welded H.R.T. and Vertical Boilers • Steel Heating Boilers • Pulverizers • Underfeed and Spreader Stokers

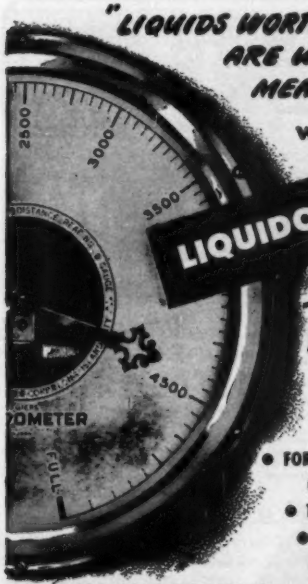
---

"LIQUIDS WORTH STORING ARE WORTH MEASURING"

with a

LIQUIDOMETER

Tank Gauge



- FOR GAUGING LIQUIDS OF ALL KINDS
- 100% AUTOMATIC
- APPROVED BY UNDERWRITERS' LABORATORIES

WRITE FOR COMPLETE DETAILS

THE LIQUIDOMETER CORP.
36-31 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

---

*Red Stripe**

Brushes Cost Less to Use... Do a Top-Notch Job Every Time!

* *Made by the manufacturers of PITTSBURGH'S famous Gold Stripe BRUSHES*

MASTER painters everywhere are turning to Pittsburgh's RED STRIPE brush. And there's a good reason... hog's bristle is expertly combined and blended with scientific Neoceta bristle. Both wear at the same rate . . . and that means smoother, neater, faster work every time!

FOR THE ADDRESS of the Pittsburgh dealer nearest you, write: PITTSBURGH PLATE GLASS COMPANY, *Brush Division*, Dept. W-11, 3221 Frederick Ave., Baltimore 29, Maryland.

PITTSBURGH
Red Stripe BRUSHES
BRUSHES • PAINT • GLASS • CHEMICALS • PLASTICS
PITTSBURGH PLATE GLASS COMPANY

330 Industrial Logistics—Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. Tells how to apply system, cites examples of use. The Elwell-Parker Electric Co.

333 All-Around Bulk Handler — Catalog Supplement 8065, 16 pp, describes the Dumpeter, a truck-mounted carrying and dumping unit which does the work of several trucks by means of interchangeable containers. Shows how different containers handle a wide range of bulk materials, solids, liquids. Dempster Bros.

334 Materials Handling Equipment — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. Describes attachments available to give trucks versatility. Yale & Towne Mfg. Co.

335 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Includes photos, data on weaving limits, weight, mesh openings, take up for wire conveyor belts. Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp.

336 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design and operations, gives tips on installation, discusses controls. Includes photos, dimensions and specifications for models listed, table showing densities of solid materials. The Jeffrey Mfg. Co.

337 Trucks, Casters, Wheels — Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

338 Data on Truck Casters—As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

339 Hydraulic Jacks—Hand, wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. Illustrated, includes specifications, selection information. Explains construction features. Blackhawk Mfg. Co.

341 How to Use Conveying Systems—Eight-pp Bulletin W-1049 shows how to effect operating and labor economies through use of conveying systems in production operations. Basic types of conveyors and where and how each can be used most efficiently are described and illustrated. Explains types of conveyors best suited to handling various products under typical conditions. Chief components of individual systems are discussed. Walter Maguire Co., Inc.

TOOLS

342 Pipe Tool Operating Guide — Form O.G. is a concise 6-pp folder prepared to help users get best results from portable pipe and bolt machines and hand pipe tools. Tells quickly how to locate and correct pipe machine and hand pipe tool troubles. Beaver Pipe Tools, Inc.

344 Pipe Tool Ordering Guide—Newly-published Catalog, 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs, and wrenches, giving dimensions, selection information. Includes price list. Armstrong Bros. Tool Co.

345 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Owatonna Tool Co.

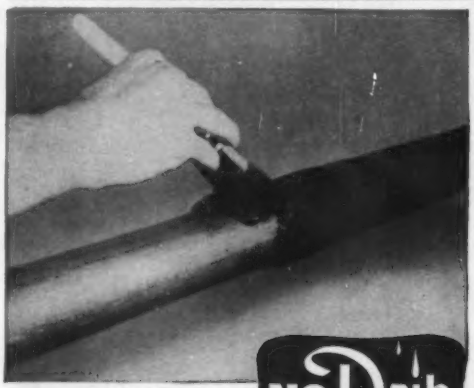
346 Ordering Guide for Tools—Catalog TR, just released, covers manufacturer's complete line of over 4000 tools. Contains 104 pp of information on all types of socket wrench equipment, hand tools and wrenches, punches, chisels, screwdrivers, pliers, tool boxes and related tools for servicing operations and maintenance work. Features large illustrations of all types of wrenches with copy keyed for easy identification. Snap-on Tools Corp.

ENGINES, GENERATORS

347 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its development and uses. Combustion Engineering-Superheater, Inc.

348 Modern Steam Engines — Stressing value of "by-product" power, Bulletin 30d describes vertical steam engines of both throttling and automatic governor types. Troy Engine & Machine Co.

349 Turbine Generators—Bulletin H-18, 40 pp, covers turbine-generators of 500 kw and above, pictures nearly 50 turbine-generator installations, both utility and industrial. Brief discussions of generator and exciter cooling methods are included. A reference section offers detailed drawings showing a typical turbine condenser installation arrangement. Elliott Co.



NoDrip

COVER PIPES, TANKS, WALLS

Anyone can brush, trowel or spray NoDrip on any clean, dry surface. Goes on like plaster, forms a seamless, protective coating.

Stops condensation drip. NoDrip keeps equipment and floors safe and dry; prevents corrosion of metal and prolongs its life. Acid, alkali and brine resistant. Comes in 1, 5 and 55 gal. drums, ready for use.

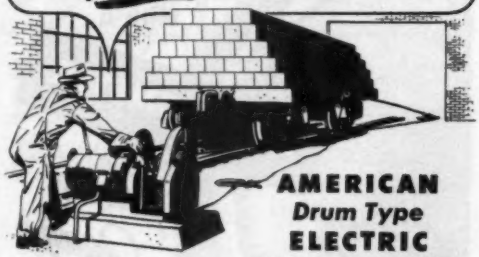
TRY NoDRIP

Apply NoDrip to a small area, compare the results with uncovered portion.

Send for free NoDrip Handbook

J. W. MORTELL CO.
537 BURCH STREET KANKAKEE, ILL.

For Pulling • Bending • Skidding *Inside the Plant*

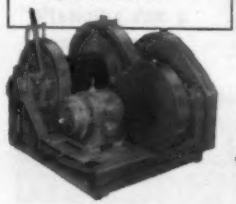


AMERICAN *Drum Type* ELECTRIC CAR PULLER

● Practical-minded plant engineers are finding American Hoist's Drum Type Car Puller a natural for many inside-the-plant jobs. They use it for spotting special cars, bending steel and skidding plant machinery. In fact, with the car puller and a pair of American Load-Rated Snatch Blocks, they can move *anything* in *any* direction. Every plant, large or small, needs this compact, economical Puller. Five models, starting line pulls ranging from 7,000 to 30,000 lbs. Heavy steel bed, machine cut gears, powerful foot-brake, steel jaw clutch.

ALSO CAPSTAN AND CONTINUOUS ROPE TYPES

WRITE FOR FREE BOOK showing full line. Contains tables to help you figure line pull needed for your types of cars, with curvature and grade factors.



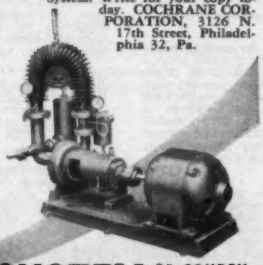
American Hoist & Derrick Company
SAINT PAUL 1, MINNESOTA

FAST, UNIFORM HEAT
NO FLASH LOSS
CONDENSATE RETURNED TO BOILERS AT HIGH TEMPERATURE AND HIGH PRESSURE

These results are obtainable through the installation of the Cochrane C-B System, a completely closed circuit, with a jet pump and a centrifugal pump incorporated in one, draining hot condensate from steam process equipment and returning it to the boiler at close-to-process temperature and at high pressure.

Savings in fuel, increase in production, improved quality are all immediately obtainable with the installation of the C-B System.

Cochrane Publication 3250 gives complete information on the C-B System. Write for your copy today. COCHRANE CORPORATION, 3126 N. 17th Street, Philadelphia 32, Pa.



COCHRANE C-B SYSTEM OF CONDENSATE DRAINAGE CONTROL

NO TRAFFIC TIE-UP!
...WHEN YOU REPAIR WITH...
QUICK-FLOOR

■ You can make a complete, permanent, heavy duty concrete floor patch (or covering) in *one minute* and is ready to use when placed. Placing causes no delay or interference to traffic . . . the rule is *place, pack,* and *use* without cutting or mixing.

1 FOOT PATCH a MINUTE!

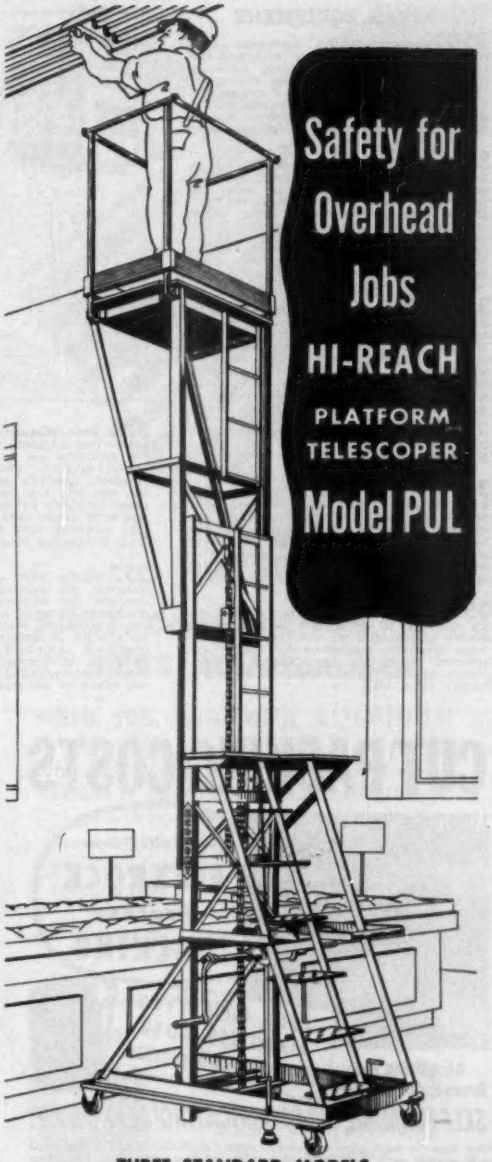
■ The continuous use of *Quick Floor* since '38 by many people *(some over three hundred drums), spells satisfaction.*

We guarantee satisfaction. Service as required.

Write for new folder.

dura-tred Co.

Manufacturers since 1938
354 N. Central Park Blvd., Chicago 24, Ill.



Safety for Overhead Jobs
HI-REACH PLATFORM TELESCOPER
Model PUL

THREE STANDARD MODELS

No. 1	Platform lift 10'9"	$305.00
No. 2	Platform lift 11'9"	315.00
No. 3	Platform lift 15'0"	340.00

Equipped with 5" diameter base wheels
Rubber-tired wheels $8.00 extra
F.O.B. Chicago
Other models with platform lift up to 95'
Write for complete specifications.

ECONOMY ENGINEERING COMPANY
4527 West Lake Street, Chicago 24, Illinois

OTHER EQUIPMENT

350 Hydrogen Zeolite Softeners — Publication 4530, 16 pp, presents hydrogen zeolite (cation exchange) water softening equipment. Gives a complete description of the process and the field of application, showing advantage of hydrogen zeolite softening and its relation to older sodium zeolite softening process. Cochrane Corp.

351 Wire Cloth and Screen—This 48-pp handbook offers valuable help in selecting and ordering industrial wire cloth and woven wire screens. It's illustrated with photos showing wire sizes, spacing, weaves and crimps and types of openings. It discusses applications of different types, and metals used. Includes weights of copper, brass and iron wire per 1,000 ft. Korb-Pettit Wire Fabrics and Iron Works, Inc.

352 Standard Screw Products—Increased interest in standards, rather than specials, has prompted this manufacturer to offer this 10-pp booklet about "Unbrako" standards, telling what they are and the advantages of their use. Gives detailed information on socket head cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts, pressure plugs, square head set screws, and dowel pins. Includes full data on sizes, prices, packaging. Standard Pressed Steel Co.

353 For Cleaner Coal Burning — This 8-pp illustrated bulletin describes company's Turbo-Aire over-fire systems designed for cleaner coal burning. Explains how they work to eliminate smoke and promote efficient combustion. Includes selection chart, specifications, fan data and characteristics. Canton Stoker Corp.

354 For Tramp Iron Removal—Sixteen-pp Catalog 15 is a new and excellent source of material on non-electric permanent magnetic separators for tramp iron removal. Complete descriptions of separators, engineering and selection data provided. Eriez Mfg. Co.

356 Case Histories on Brushing Problems—The solutions to 12 industrial brushing problems are told in this 32-pp illustrated booklet. Shows how rotary wire brushes, specially selected or engineered for the job, are used to clean welds in meat handling equipment, to finish stainless steel sheets, and perform other abrading, cleaning and finishing jobs. Brush Div., Pittsburgh Plate Glass Co.

357 Solder Text — This 36-pp book is basically an editorial treatise. Separate sections are devoted to thermal effects, mechanical properties, principles of soldering and fluxes. Selection of proper solder for the job is explained, and fusible alloys described. Practical suggestions and description of company's solders are provided, also technical data, including melting range of tin-lead solders, ASTM, SAE and other specifications. Federated Metals Div., American Smelting and Refining Co.

359 For Spotting of Overhead Loads—Bulletin 921-A on magnetic crane controls for d-c cab-operated cranes lists standard features for crane-hoist service and bridge or trolley service. Explains time-current method of acceleration, operating principle of Wright dynamic lowering circuit controller. The Electric Controller & Mfg. Co.

360 Industrial Dry Coolers—Illustrated Bulletin DC-50, 12 pp, presents company's dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium-size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

362 Four Handy Guides for Plant Engineers—Bulletin 20B6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B-6025K, 12 pp, for quick selection of electric motors; Bulletin 52B6059E, 16 pp, for selection of centrifugal pumps, and Bulletin 25B6051B, for power generation, distribution and control equipment. Specify booklets wanted. Allis-Chalmers Mfg. Co.

364 Group Washing Equipment—Washfountains designed for modern group washing requirements for industrial plants and institutions are described and pictured in Bulletin D-766. Bradley Washfountain Co.

365 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. Shows how unit is designed. C-O-TWO Fire Equipment Co.

366 For Conductometric Determination of Solids—A quick and simple method for determining solids content of boiler water or condensate is explained and illustrated in Bulletin 2RE50. Hall Laboratories, Inc.

CUT PACKING COSTS

Use Multi-Purpose **FLEXROCK Process PACKING**

JUST ONE TYPE HANDLES 90% of your Packing Applications

Simplifies the Inventory Problem!

SELF-FORMING! SELF-LUBRICATING! LEAK-PROOF!

One type—in most cases one size of new FLEXROCK PROCESS PACKING will answer most packing needs for the average plant . . . eliminates stocking of countless varieties. With only nominal gland pressure, FLEXROCK PROCESS PACKING forms itself into a leak-proof, self-lubricating seal the exact size and shape of any pump stuffing box or fitting into which it is placed. Available in coil or spiral form, jacketed or unjacketed. Write for FREE Catalog.

MAIL THIS COUPON

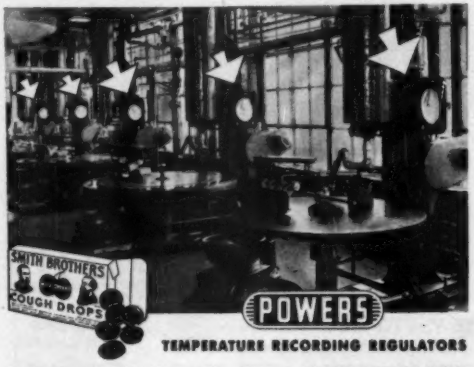
FLEXROCK COMPANY, Packing Division
3615 Cuthbert St., Phila. 4, Pa.

I am interested in FLEXROCK PROCESS PACKING. Please send Catalog. No obligation.

Name .....

Company .....

City ..... Zone..... State .....



TEMPERATURE RECORDING REGULATORS

Help Insure Uniform Quality at SMITH BROTHERS

Above: Recording Regulator

Right: Powers Flowrite Valve

For over 104 years Smith Brothers cough drops have been famous for their good flavor. Cooking operations here are accurately controlled and recorded by POWERS air operated regulators. They save labor and prevent losses caused by over-heating. Air conditioned packaging rooms also are Powers controlled.

When you want better temperature and humidity control for any process, heating or air conditioning system, contact our nearest office. There's no obligation. (a57)

THE POWERS REGULATOR CO.

Over 60 Years of Temperature and Humidity Control

SKOKIE, ILL. • Offices in Over 50 Cities • See Your Phone Book

Because they wear longer...stand up better to the destructive effects of heat, abrasion, corrosion and chemical action, Wissco Metal Processing Belts have become the accepted standard for varied applications involving processing and heat treating.

They're your assurance of uninterrupted trouble-free production at a time when stoppages cannot be tolerated.

For additional information write or phone our nearest sales office.

EAST: Wickwire Spencer Steel Division, Clinton, Mass.
WEST: The Colorado Fuel & Iron Corporation, Denver, Colorado
PACIFIC COAST: The California Wire Cloth Corporation, Oakland, California

WISSCO BELTS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

---

a practical new book about Electron Tubes

. . . what they are
. . . how they work
. . . how they can be used
. . . what they can mean to you

INDUSTRIAL ELECTRONICS

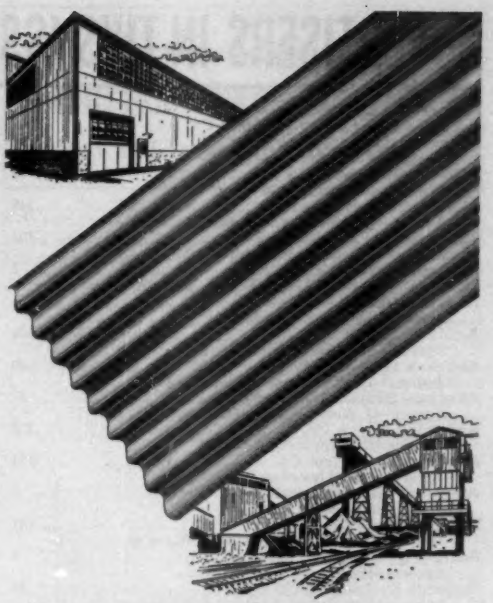
by Andrew W. Kramer

This new book explains in clear, simple, non-technical style the basic principles of electronics, and how these principles can be applied in industry. Electronics has been solving the unsolved problems. Whether it is navy beans, opening doors at a shadow, or measuring the thickness of red-hot steel plates, the electron is the newest and most efficient force captured by science. This book should be invaluable for the practical maintenance or operating executive or engineer. 311 pages, 229 illustrations, $6.00.

CHAPTER HEADINGS: Electron Behavior, Fundamental Principles of Electron Tube. The Simplest Thermionic Tube—the Diode. The Triode. Further Aspects of Triode Characteristics and Operation. Electronic Generation of Electric Oscillations. Multielement Tubes. Effect of Gas in a Tube. Types of Characteristics of Gas-filled Tubes. Mercury-pool Tubes. Photoelectric Tubes and Cells. Cold-cathode Tubes. Special-purpose Tubes. What Tubes Can Do. Electronic Control and Regulation. Application of Electron-tube Rectifiers. Electronics in Instrumentation and Measurement. Industrial Applications of Electronic Control. Application of Electronic Regulation. Electron Tubes in Light Production. Miscellaneous Electronic Applications.

Send Your Orders to

BOOK DEPT. PLANT ENGINEERING
110 SOUTH DEARBORN STREET, CHICAGO 3, ILL.



FAST Construction LESS Maintenance

when you build with ALUMINUM

All the facts you need to design and erect buildings using Alcoa Industrial Building Sheet have been assembled in this new book. Loading tables, application details and accessory lists, show you how you can save erection time and maintenance costs.

Write for FREE BOOK

BECAUSE REARMAMENT NEEDS COME FIRST, the supply of Alcoa Industrial Building Sheet is limited, but Alcoa is not limiting its assistance to designers and erectors. For special information and a copy of booklet AD-247, call your local Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 805L Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA

ALCOA
INDUSTRIAL BUILDING SHEET

ADVERTISERS IN THIS ISSUE

When writing to advertisers for information please tell them you saw their ad in Plant Engineering—or use the handy post card on "Bulletins" insert in this issue.

Acheson Colloids Corporation 17
Agency—John Mather Lupton Co.
Allen-Bradley Co. 94
Agency—Fensholt Company, The
Allis-Chalmers Mfg. Co. 51, 93
Agency—Compton Advertising, Inc.
Aluminum Co. of America 149
Agency—Fuller & Smith & Ross, Inc.
American Air Filter Company, Inc. 109
Agency—The Griswold Eshleman Co.
American Blower Corporation 8
Agency—Brooke, Smith, French & Dorrance, Inc.
American District Steam Co. 55
Agency—Squier and Davis, Inc.
American Hoist & Derrick Co. 146
Agency—The Alfred Colle Company
American Monorail Co., The 30
Agency—The Bayless-Kerr Company
American Structural Products Co. 97
Agency—J. Walter Thompson Company
Armstrong-Bray & Co. 152
Agency—Ross Llewellyn, Inc.
Armstrong Bros. Tool Co. 134
Agency—Ross Llewellyn, Inc.
Armstrong Machine Works 5
Agency—Russell T. Gray, Inc.
Barber-Colman Co. 141
Agency—Cummings, Brand & McPherson
Beaver Pipe Tools, Inc. 4
Agency—Meek and Thomas, Inc.
Benjamin Electric Mfg. Co. 39
Agency—Van Auken, Ragland & Stevens
Big Joe Manufacturing Co. 143
Black, Sivalls & Bryson, Inc. 50
Agency—R. J. Potts, Calkins & Holden
Boston Woven Hose & Rubber Company 49
Agency—Sutherland-Abbott
Bradley Washfountain Co. 120
Agency—Kirkgasser-Drew
Buell Engineering Co., Inc. 114
Agency—Hicks & Greist, Inc.
California Wire Cloth Corporation, The, Subsidiary of The Colorado Fuel and Iron Corporation 144, 149
Agency—Doyle, Kitchen & McCormick, Inc.
Canton Stoker Corporation 22-23
Agency—The Jayme Organization
Cash Company, A. W. 12
Chesterton Company, A. W. 139
Agency—W. Robert Robotham Co.
Chiksan Company 106
Agency—Roy F. Irvin
Cleveland Crane & Engineering Co., The ... Inside Back Cover
Cochrane Corporation 147
Agency—Willard G. Myers Adv. Agency
Colorado Fuel & Iron Corporation, The Wickwire Spencer Steel Division 144, 149
Agency—Doyle, Kitchen & McCormick, Inc.
Combustion Engineering—Superheater, Inc. 14, 15
Agency—G. M. Basford Company
C-O-TWO Fire Equipment Company 38
Agency—G. M. Basford Company
Crane Company 54
Agency—The Buchen Company
Darling Valve & Mfg. Co. 60
Agency—The Griswold-Eshleman Co.
Dart Union Company 52
Agency—Sutherland-Abbott
Dayton Rubber Company 10, 11
Agency—Geyer, Newell & Ganger, Inc.
Dempster Brothers 35
Agency—Charles S. Kane Co.
Diamond Chain Company, Inc. 117
Agency—Kirkgasser-Drew
Dixon Crucible Co., Joseph 126
Agency—Rickard & Company
Dodge Manufacturing Corporation 36, 37
Agency—Lamport, Fox, Prell & Dolk, Inc.
Douglas Fir Plywood Association 53
Agency—The Condon Company, Inc.
Dracco Corporation 48
Agency—The Jayme Organization, Inc.
Durametallic Corporation 136
Agency—Ogden Advertising
Dura-Tred Company 147
Agency—Edgar Walter Fischer
Economy Engineering Company 147
Agency—Kreicker & Meloan, Inc.
Electric Controller & Mfg. Co., The 34
Agency—The Bayless-Kerr Company
Elwell-Parker Elec. Co., The 132
Agency—The Bayless-Kerr Company
Erie City Iron Works 145
Agency—Davies & McKinney
Fairbanks-Morse & Co. 27
Agency—The Buchen Company
Feedrail Corporation 143
Agency—W. L. Towne Advertising
Fenestra Building Products 92
Agency—Fuller & Smith & Ross, Inc.
Flexrock Company 144, 148
Agency—Walter S. Chittick Company
Fuller Company 21
Agency—O. S. Tyson and Company, Inc.
Garlock Packing Company, The 96
Agency—Hutchins Advertising Co.
Gates Rubber Company, The 43
Agency—Cloyd F. Woolley, Inc.
General Electric Company 25
Agency—G. M. Basford Company
Goodrich Co., The B. F. 3
Agency—The Griswold Eshleman Co.
Goodyear Tire & Rubber Co. ..... Back Cover
Agency—Kudner Agency, Inc.
Gould-National Batteries, Inc. 44
Agency—Hutchins Advertising Company
Grinnell Company, Inc. 125
Agency—Horton-Noyes Company
Gulf Oil Corporation 47
Agency—Young & Rubicam, Inc.
Hercules Powder Company 104
Agency—Fuller & Smith & Ross, Inc.
Insul-Mastic Corp. of America 13
Agency—Dan A. Sullivan
Jeffrey Mfg. Co., The 91
Agency—Byer & Bowman Advertising Agency
Jenkins Bros. 110
Agency—Horton-Noyes Company
Joy Mfg. Co. 103
Agency—Walker & Downing
Kalman Floor Company, Inc. 31
Agency—Jones & Brakeley
Keller Tool Co. 130
Agency—The Fensholt Company
Kirk & Blum Mfg. Co., The 105
Agency—The S. C. Baer Company
Koiled Kords 126
Agency—Hugh H. Graham & Associates, Inc.
Koppers Co., Inc., Tar Products Division 131
Agency—Batten, Barton, Durstine & Osborn, Inc.
Korb-Pettit Wire Fabrics and Iron Works 122
Agency—Carl Mason Craig
Liquidometer Corp., The 145
Agency—Lucerna Company, The
Mark & Co., Clayton 42
Agency—Robert W. Race
Masonite Corporation 135
Agency—The Buchen Company
Mercoid Corporation, The 132
Micro Switch 101
Agency—Hamilton Advertising Agency, Inc.
Minneapolis-Honeywell Regulator Co. 33, 124
Agency—The Aitkin-Kynett Co.
Mortell Co., J. W. 146
Agency—Arthur C. Barnett
Nagle Pumps, Inc. 138
Agency—Tri-State Advertising Co., Inc.
Nicholson & Co., W. H. 29
Agency—Wilbur A. Myers
Pangborn Corporation 137
Agency—Vansant, Dugdale & Company
Pittsburgh Coke & Chemical Co. 116
Agency—Walker & Downing
Pittsburgh Plate Glass Company 145
Agency—Vansant, Dugdale & Company
Powell Co., The Wm. 95
Agency—Associated Advertising Agency, Inc.

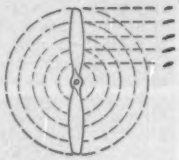
Powers Regulator Co., The 148
Agency—Symonds, MacKenzie & Company, Inc.
Pritchard & Company, J. F. 138
Agency—Carter Adv. Agency, Inc.
Pyramid Instrument Corporation 107
Agency—Reiss Advertising
Republic Rubber Division 24
Agency—Meek and Thomas, Inc.
Richards-Wilcox Mfg. Co. 118
Agency—George H. Hartman Company
Robbins & Myers, Inc. 32
Agency—Erwin, Wasey & Company, Ltd.
Robbins & Myers, Inc. 102
Agency—R. L. Odiorne
Robbins & Myers, Inc. 151
Agency—Greenhaw & Rush, Inc.
Rohm & Haas Company 41
Agency—John Falkner Arndt & Company, Inc.
Rome Cable Corporation 115
Agency—Charles L. Rumrill & Co., Inc.
Roper Corporation, Geo. D. 100
Agency—Cummings, Brand & McPherson
Ruemelin Mfg. Co. 143
Agency—Paulson-Gerlach & Associates, Inc.
Sarco Company, Inc. 18
Agency—Gus Binz Associates
Sexauer Mfg. Co., Inc., J. A. 122
Agency—Reiss Advertising
Sims Pump Valve Co., Inc. 140
Agency—Terrill Belknap Marsh Associatees
SKF Industries, Inc. 16
Agency—O. S. Tyson and Company
Sly Mfg. Co., The W. W. 130
Agency—The Bayless-Kerr Company
Snap-On Tools Corporation 40
Agency—The Cramer-Krasselt Co.
Spencer Turbine Co., The 56
Agency—W. L. Towne Advertising
Standard Oil Company (Indiana) 9
Agency—McCann-Erickson, Inc.
Standard Pressed Steel Co. 140
Agency—R. E. Lovekin Corp.
Texas Company, The ..... Inside Front Cover
Agency—Erwin, Wasey & Company, Inc.
Thompson Electric Co., The 108
Agency—Penn & Hamaker
Tide Water Associated Oil Company 121
Agency—G. M. Basford Company
Trane Co., The 26
Agency—Tatham-Laird, Inc.
Tremco Manufacturing Co. 124
Agency—The Griswold-Eshleman Co.
Troy Engine & Machine Co. 128
Agency—Sanger-Funnell, Inc.
Trumbull Electric Manufacturing Company, The 57
Agency—James Thomas Chirurg Co.
Tubing Appliance Co. 136
Agency—Byron H. Brown and Staff
United States Gasket Co. 58
Agency—Michener & Holland
United States Gauge 129
Agency—John Falkner Arndt & Company, Inc.
U. S. Electrical Motors, Inc. 19, 20
Agency—The McCarty Company
Walworth 98
Agency—G. M. Basford Company
Warren Refining & Chemical Co., The 134
Agency—John Yezbak & Company
Wayne Pump Co., The 142
Agency—Bonsib Advertising Agency
Westinghouse Electric Corporation 6-7, 99, 119, 127
Agency—Fuller & Smith & Ross, Inc.
Westinghouse Lamp Division 113
Agency—Fuller & Smith & Ross, Inc.
Weston Electrical Instrument Corporation 133
Agency—G. M. Basford Co.
Whitney Chain Company 94A
Agency—Sutherland-Abbott
Wickwire Spencer Steel Division of
The Colorado Fuel & Iron Corporation 144, 149
Agency—Doyle, Kitchen & McCormick, Inc.
Wing Mfg. Co., L. J. 141
Agency—Willard G. Myers Adv. Agency
Worthington Pump & Machinery Corp. 61
Agency—James Thomas Chirurg Co.
Yale & Towne Mfg. Co. 123
Agency—Ruthrauff & Ryan, Inc.
Yarnall-Waring Company 62
Agency—Michener & Holland

How to Buy

INDUSTRIAL PROPELLER FANS

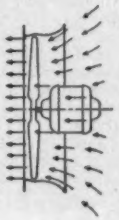
for Efficiency and Economy

■ When you are expanding or improving your plant ventilating system, be sure to compare available fans on the following features:



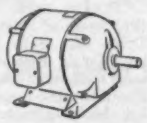
The Propeller

Look for an Airfoil section propeller of cast aluminum. It offers maximum efficiency, positive displacement, rigidity, resistance to corrosion, and freedom from bending fatigue. Protection against motor failure is provided by the unloading characteristic of Airfoil propeller sections.



The Entrance Ring

One of the most important improvements in fan design is the deeper, smoother, curved entrance ring which prevents eddy currents or back flow at propeller tips. It increases air capacity, giving more uniform velocity and greatly improved performance under pressure conditions.



The Motor

"Weatherized" motors with sealed ball bearings give trouble-free service anywhere, in any climate. Every metal part is protected from harmful rust and corrosion. Motor should be sealed and insulated for efficient, maintenance-free service even under severe moisture conditions. Motor bearings should have thrust capacity for operation in any position.

Certified Rating

The fan should be tested and rated according to the Standard Test Code of the A. S. H. & V. E. It should carry the Certified Rating Label of the Propeller Fan Mfrs. Assn. and should comply with U. S. Commercial Standards.

LET US HELP YOU—For over 20 years, Propellair has been helping leading companies solve their air moving problems. All this experience is yours, without charge. Tell us your problem and we'll give you our recommendations.

Propellair Fans have propellers, entrance rings, motors and Certified Ratings that meet the specifications outlined above. They are economical—in initial cost, in operating expense, in maintenance. Above all, they are rugged and dependable. There's a Propellair Fan for every industrial need.

Write for our new Bulletin E-3238

PROPELLAIR
DIVISION OF ROBBINS & MYERS, INC.
SPRINGFIELD · OHIO

PLANT ENGINEERING

EDITORIAL STAFF

RICHARD H. MORRIS, *Editor*
Lt. Col. on duty with the USAF
T. E. HANSON, *Managing Editor*
R. L. MARINELLO, *Associate Editor*
EMIL B. SKUBIK, *Associate Editor*
C. R. EARLE, *Associate Editor*
M. E. HENIKEN, *Equipment Editor*
A. W. KRAMER, *Contributing Editor*
R. E. TURNER, *Consulting Editor*
JAMES E. WILCOX, *Staff Artist*

Published Monthly by
Technical Publishing Co.
110 S. Dearborn St., Chicago 3, Ill.

KINGSLEY L. RICE, *President*
EDWIN C. PROUTY, *Exec. Vice Pres.*
WALTER PAINTER, *Vice President*
EDWIN C. PROUTY, JR., *Secretary*
ARTHUR L. RICE, JR., *Treasurer*
RALPH E. TURNER, *Edit. Advisor*
JOHN O. AARVOLD, *Prod. Manager*

RICHARD M. WARD
Vice President in Charge of Sales

DISTRICT MANAGERS

CHICAGO: John R. Morrison
Walter Painter
110 S. Dearborn St., Chicago 3, Ill.
Phone: DE arborn 2-5446

NEW YORK: Richard Y. Fuller
Oscar Wilds
1613 Graybar Bldg., New York 17, N. Y.
Phone: Murray Hill 5-3779

PHILADELPHIA: Oscar Wilds
1235 Jericho Road, Abington, Pa.
Phone: Ogontz 7261W

CLEVELAND: Richard M. Ward
George L. Wright, Jr.
2945 Fairmount Blvd.
Cleveland Heights, Ohio
Fairmount 1-0616

PACIFIC COAST: McDonald-Thompson
J. Leslie Meek
625 Market St.
San Francisco 5, Cal.
Phone: Yukon 6-0647

Connie J. Grabb
3727 West Sixth Street
Los Angeles 5, Calif.
Phone: Dunkirk 7-5391

Harry Abney
Terminal Sales Bldg.
Seattle 1, Wash.
Phone: Main 3860

SOUTHWEST: McDonald-Thompson
Richard C. Wipperman
McDonald-Thompson
1118 Odeans Drive
Dallas 11, Texas
Phone: Winfield 4911

SERVICE OFFICES:
115 S.W. 4th Ave.
Portland 4, Ore.
Phone: Atwater 7401

317 Railway Exchange Bldg.
Denver 2, Colo.
Phone: Main 2733

ABC

Subscription Information—Published Monthly
Prices: United States and Possessions one year $10.00, Canada one year $11.00. Other countries one year $12.00. Single copies $1.00.

Copyright, 1951 by Technical Publishing Co.

'ROUND ABOUT

with the editors

Film on Atomic Bomb Defense For Plants and Personnel

BASED ON STUDIES made by the National Security Resources Board with the assistance of the Department of Defense and the Research Institute of America, "Target, U.S.A.," a 20 minute sound film, is a graphic demonstration of industry and personnel in action prior to and under an atom bomb attack.

The film answers such basic problems as how to protect people and property, how to build up effective plant-wide defense, how and where to build and allocate shelters, how to recruit a defense corps, how to set up first aid stations, how to safeguard important records, and what management and labor can do right now to set up protective measures against the possibility of an atomic attack.

Further information about this motion picture can be obtained by writing to Department PE, Cornell Film Co., 1501 Broadway, New York 18, N. Y.

Editor Gets Slap on Knuckles

"PLEASE REFER to page 76, July 1951 issue of PLANT ENGINEERING. In Table III, Safe Loads in Pounds, for Manila Rope, the diameter column shows 1¾ listed twice. Shouldn't the figure between 1¼ and 1½ be 1⅜ rather than 1¾?

"Was copying chart for use here in the plant and noticed the error. We find many useful articles in your magazine and thought you might appreciate the above information so you could make the correction." —T.C.W.

EDITOR'S NOTE: You are quite right. The first 1¾ in the diameter column of Table III should be corrected to 1⅜. Thank you very much for calling this mistake to our attention.

Centennial of Engineering

THE CENTENNIAL of Engineering will be held in Chicago in 1952, at the Museum of Science and Industry, from July 1st to September 30th. Occasion for the Centennial will be the 100th anniversary of the founding of the American Society of Civil Engineers. However, instead of being limited to this one group, all other branches of engineering will pool their forces to depict the history and achievements of engineering in all its phases through an integrated program.

The program will include three features: The first will cover numerous symposia on various engineering phases. The second feature will be a theater pageant which will depict scenes of engineering episodes that have stood out most preeminently for their benefits to human progress. The third will consist of exhibits covering original inventions, models and dioramas showing the evolution of engineering.

Additional information may be obtained from Centennial of Engineering, Museum of Science and Industry, 57th Street and Lake Shore Drive, Chicago 37, Illinois.

Get Ready for the Plant Maintenance Show

PLANS FOR the third Plant Maintenance Conference, to be held concurrently with the Plant Maintenance Show at Convention Hall, Philadelphia, January 14-17, will include 34 separate discussions, consisting of 6 general conferences, 27 sectional meetings and the annual banquet.

On the first day, five sectional sessions will take up project preparation, maintenance in plant buildings, in chemical plants, in metalworking plants, and of electrical equipment. On the second day, there will be six sectional conferences on problems peculiar to the size of the plant and the maintenance it requires.

On the last day of the conference, 16 round-table groups will meet. Topics will include organization of personnel; maintenance operating policies; safety and plant protection; plant housekeeping; welding; maintenance of mechanical equipment; maintenance of power plants and service equipment; and maintenance applications of handling equipment and its upkeep.

Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

CLASSIFIED ADVERTISING

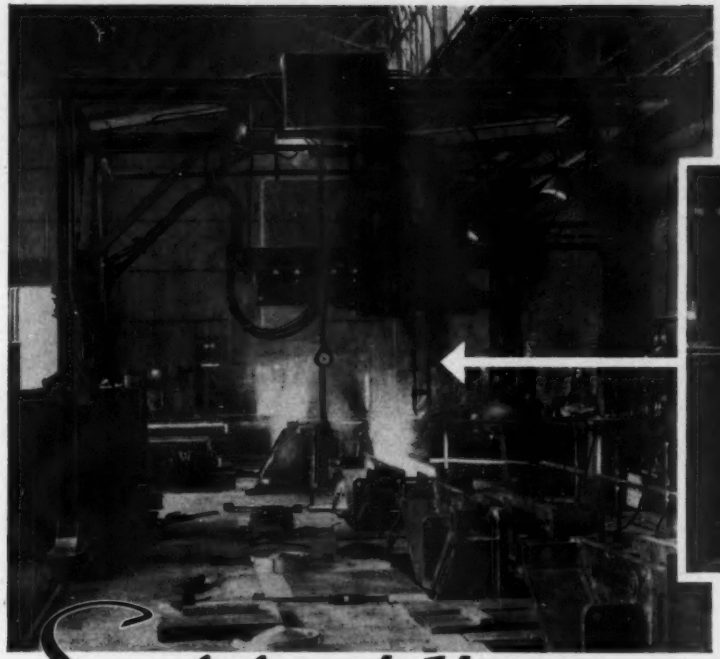
EQUIPMENT FOR SALE

MOTOR GENERATOR SET
Complete with Control Panel, Meters and Oil Circuit Breakers with
GENERAL ELECTRIC DIRECT CURRENT GENERATOR
20 Kw., 70 Amps., 115 Volts
Class 6-20-750, Form B
Speed 750 R.P.M., Shunt
Type C1, 25, No. 8.2296

SYNCHRONOUS MOTOR
No. 413936 P.F.I.
Type AT 1 Class 4-560-750
Form C. H.P. 710 Speed 750
Volts 2300 Amps. 140 Cycles 25
Pat'd. Aug. 13-95, Aug. 20-90, Nov. 20-00, Dec. 2-02.
General Electric Co., Schenectady, N. Y., U.S.A.

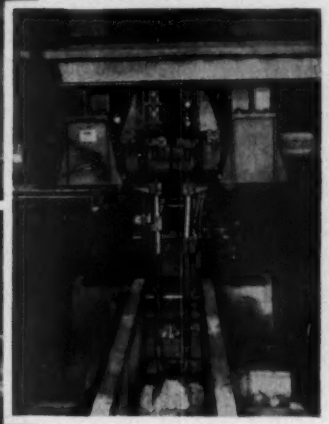
GENERAL ELECTRIC SYNCHRONOUS MOTOR
No. 8.2312 Class 10-500-750 Type A.T.B.
Volts 550, Phase 3, Amps. 525
R.P.M. 750, Cycles 62.5

THE MONARCH KNITTING COMPANY, LIMITED
Joseph Simpson Division
8 Berkeley Street Toronto 2, Canada



Left — This welding gantry in a prominent steel mill is the first application of the new Cleveland Tramrail stabilized hoist principle for welding purposes.

Below — The welding heads supported by the stabilized hoist, travel without sway or vibration and automatically apply a straight continuous and accurate welding bead.



Stabilized Hoist PROVIDES ~

VIBRATION-FREE TRAVEL FOR UNION MELT WELDING

The first application of a Cleveland Tramrail stabilized hoist for automatic welding by the Union Melt Process has proven completely successful. The stabilized hoist eliminates all vibration and pendulum motion at the welding heads, permitting the laying of straight, perfect welds.

The two welding heads are secured to the load bar of the hoist. The hoist in turn is supported by the Cleveland Tramrail gantry crane. The stabilized hoist which remains absolutely rigid in any position because of the unique triangular hoisting rope arrangement, can be adjusted to any height within 4'0" limits. Welds can be made of any length up to the length of the crane runway.

Welding speed may be varied from 4 to 80 inches per minute by changing the gantry travel speed by means of push buttons on the pendant control cable. A tachometer on the cable just above the buttons keeps the operator informed of the welding speed.

The gantry crane with stabilized hoist is lighter and easier to manipulate than the usual heavy structural type of welding travel equipment. It is simple to adjust, convenient to use and very flexible in application to different kinds of work.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7554 EAST 234TH ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

You can belt down handling costs

NO MATTER what the material you have to move—inside or outside your plant—it'll pay you to investigate conveyor belts. The G.T.M.—Goodyear Technical Man—can analyze your problems drawing on experience gained from successful installations throughout industry—match *your* problems with others to prove that conveyors can be the most economical cargo-handlers. And he can choose from a wide selection of belt constructions to specify the one that will give you the longest, most trouble-free service on your particular job. Get in touch with the G.T.M. today by calling your nearest Goodyear distributor, or writing Goodyear, Akron 16, Ohio.

THREE TYPICAL G.T.M.-SPECIFIED CONVEYORS THAT ARE CUTTING COSTS

◀ **Old-style chain conveyors outperformed by a Goodyear conveyor 3 to 11 Over 1,000 tons of fish per hour are carried into the processing plant of this fertilizer maker, at lower cost per ton than ever before.**

Paper mills everywhere are turning to conveyors to handle logs, chips and other raw materials. Here, too, the G.T.M. has made appreciable savings by designing systems to replace former materials-handling systems, ▼ operate at lower cost.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GTM-Specified CONVEYOR BELTS

A few of the materials and service conditions that can be handled

- Single flights up to 5 miles; lifts to 1500'
- Extremely abrasive materials
- Hot materials
- Rugged service on grading machinery
- Underground service in coal mines
- Sanitary handling of foods in canneries
- Extreme oil conditions
- Soupy materials, like cement
- Boxes and packages in plants and stores
- Packaged or bagged materials on inclines
- All types of grain handling

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

▲ Assembly-line operations can be conveyorized, too—with Goodyear's CHEMIGUM belts that withstand the attack of oil 50 times as well as natural rubber. That means longer life—lower cost—fewer interruptions of output.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS ***built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.***

GOODYEAR

THE GREATEST NAME IN RUBBER